PLANT BREEDING ABSTRACTS

Vol. XXV, No. 3
(Abstracts Nos 1523—2546)

Compiled from World Literature
by the

COMMONWEALTH BUREAU OF PLANT BREEDING AND GENETICS

1 July, 1955

Commonwealth Agricultural Bureaux,
Farnham Royal, England

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* General studies, see also individual crops

C. A. S.
14 JUL 1955

Plant Breeding Abstracts

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*STATISTICS

1523 Layman, J. C. & Bradley, R. A.
The effects of bimodality and of skewness in a population on the distribution of "t".
Virginia J. Sci. 1954 : **5** : 336–37.

A mixed population with density function $f(x) = a_1\phi_1 + a_2\phi_2$, where $a_1 + a_2 = 1$, $a_1, a_2 \geq 0$ and ϕ_1, ϕ_2 are normal densities was considered. Analysis of two special forms of this kind indicated that the deviation of t from the value corresponding to a normal population was slight provided that the departure from normality was no more than moderate.

1524 Zeller, A.
Zur Terminologie einiger Begriffe der naturwissenschaftlichen und der Stichproben-Statistik. (**On the terminology of some concepts pertaining to scientific and sampling statistics**).
Statist. Vjschr. 1950 : **3** : 141–45.

The best German equivalents for standard English statistical terms are discussed. The following translations are suggested: "variety" in field trials, *Prüfnummer*; estimation, *Bestimmung* or *Berechnung*; the probability of a null hypothesis, *Zufallswahrscheinlichkeit*; sum of squares, *Abweichungsquadratsumme* or *Quadratsumme*; mean square (variance), *Varianz*; and randomization, *Unordnung*.

1525 Wang, C. -M.
(**Notes on multivarietal trials. II. Triple lattice**).
Taiwan Tahsueh Nunghsuehyuan Yenchiu Paokao/Mem. Coll. Agric. Taiwan Univ. 1953 : **3** : 1–19. [Chinese].

In the second article of this series (cf. *PBA*,† Vol. XXIV, Abst. 2591), the author compares three methods for analysing the results of triple lattice designs: (1) Yates's method; (2) Cochran's weighting method; and (3) a method devised by the author which supplies further varietal information than Yates's method and eliminates the block effect. While slightly less efficient than Cochran's method, the author's method dispenses with weighting.

1526 Mudra, A.
Bemerkungen zu der Arbeit von N. Atanasiu: Zur Frage der Anlage und Auswertung der Feldversuche. (**Observations on N. Atanasiu's article: On the question of the layout and evaluation of field experiments**).
Z. Pflanzenz. 1954 : **34** : 1–6.

Atanasiu's criticisms of the application of analysis of variance to field trials (cf. Abst. 638) are rejected and Atanasiu is accused of being insufficiently cognizant of the relevant statistical theory.

1527 Zoellner, J. A. & Kempthorne, O.
Incomplete block designs with blocks of two plots.
Res. Bull. Ia. agric. Exp. Sta. 1954 : No. 418 : 173–80.

A complete array of incomplete block designs with blocks of two plots for 6–12 treatments is given. The designs are chosen so as to provide the highest efficiency factor applicable to each situation. A fictitious example to illustrate the computation required for a design involving 7 treatments and 4 replications is worked out.

1528 Hatamura, M., Okuno, T. & Sasaki, T.
(**The design and analysis of field experiments**).
Nogyo Gijutsu Kenkyusho Hokoku/Bull. Nat. Inst. agric. Sci. 1954 : Ser. A : No. **3** : 1–214. [Japanese].

A mathematical theory for the analysis of completely randomized and randomized block designs is developed; it is assumed that plot contributions must be taken into account but that variety-block and variety-plot interactions can be ignored. It is assumed that the joint distribution of the errors is normal.

A general theory for complete and incomplete block designs is then developed, the various lattice designs being analysed as special cases.

1529 Müller, K.-H.
Zur Bodenstreuung bei Feldversuchen. (**Soil variation in field trials**).
Z. Acker- u. PflBau. 1955 : **99** : 119–25.

Appropriate methods for detecting and allowing for systematic variation in the soil of a field trial in the course of analysis of variance are briefly discussed.

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* General studies, see also individual crops.

† *Plant Breeding Abstracts.*

*GENETICS

1530 STERN, C.
Genetics and the world today.
Rep. Smithson. Instn. 1953 (1954) : Publ. 4149 : 263–76.

The role and nature of the gene are discussed for the benefit of the nongeneticist and the significance of genetics in improving agricultural production and in sociological problems is touched upon.

1531 STOMPS, T. J.
On the rediscovery of Mendel's work by Hugo de Vries.
J. Hered. 1954 : **45** : 293–94.

Some facts are given concerning the rediscovery in 1900, by de Vries, of the paper published by Mendel in 1865. The author writes on the basis of his personal acquaintance with de Vries and dispels the belief sometimes held, as the result of an article by Correns in 1900, that de Vries suppressed the name and work of Mendel. He also points out that de Vries used the term pangene in the collective sense; he therefore rejects the new term panallele proposed by Dawson and Whitehouse as a collective noun for all the alleles at a locus (cf. *PBA*,Vol. XXII, Abst. 1575).

1532 SCHIEMANN, E.
Emmy Stein. 21. VI. 1879—21. IX. 1954.
Züchter 1955 : **25** : 65–67.

An account of the life and career of the German geneticist E. Stein, best known for her work on the induction of mutations in *Antirrhinum*, is presented.

1533 MARQUARDT, H.
Untersuchungen über die Zuverlässigkeit der genetischen Methode zur Feststellung der Mutationshäufigkeit bei Pflanzen. (**Investigations on the reliability of the genetic method in establishing the mutation frequency of plants**).
Strahlentherapie 1954 : **94** : 608–31.

The effects of X-irradiating the pollen grains of *Oenothera hookeri* were investigated in the F_1 and F_2 generations in experiments at the Institute of Botany, Freiburg University, the doses employed being 1000, 2500, 4500 and 5000 r. The amount of pollen deposited on the stigma, the degree of ripeness of the seed and the choice of plants used as the ♀ parent exercised a considerable influence on germinability and number of aberrant F_1 plants obtained. The percentage of mutations found in the F_2 was dependent not only upon the amount of X-irradiation employed but also upon the occurrence of lethal mutations in the F_1 and upon external environmental conditions.

1534 BATEMAN, A. J.
Self-incompatibility systems in angiosperms. II. *Iberis amara.*
Heredity 1954 : **8** : 305–32.

The Cruciferous species *I. amara* possesses an incompatibility system combining sporophytic control of pollen and style with a series of multiple *S* alleles (cf. *PBA*, Vol. XXIII, Abst. 1637). Such a system has hitherto been observed only in the Compositae. Both dominance and independence of *S* alleles was expressed in the pollen or style but the relationship of a given pair of alleles was not necessarily the same in both sexes.

1535 CROWE, L. K.
***S* gene structure revealed by the cytoplasm.**
Heredity 1954 : **8** : p. 434. (Abst.).

"There is a difference in the behaviour of hybrids from reciprocal crosses between the self-incompatible species *Oenothera pallida* ($S_{1.2}$) and the self-compatible species *Oe. trichocalyx* (*Sf.f*). This is caused by the effect of the cytoplasm on the pollen.

"S_1 and S_2 pollen, developed from hybrids carrying both the *Sf* allele and the cytoplasm from *Oe. trichocalyx*, has retarded pollen tube growth in compatible styles. S_1 pollen from $S_{1\cdot2}$ with *Oe. trichocalyx* cytoplasm is similarly retarded. The incompatibility reaction of the pollen is not affected.

"In the *Oe. pallida* cytoplasm growth of S_1 and S_2 pollen is not retarded.

"These facts will be interpreted by assuming a new gene in the *S* complex and that the place of action of this gene has been changed from the gametophyte to the sporophyte by the cytoplasm."

1536 LEWIS, D.
***S* gene structure—new evidence from tetraploidy and mutation.**
Heredity 1954 : **8** : p. 435. (Abst.).

"In diploid pollen grains of tetraploids, *S* alleles interact to give dominance or competition.

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* General studies, see also individual crops.

Mutant S alleles produced by X-rays and spontaneously have lost their 'pollen' specificity. "When these specificity deficient alleles are incorporated into diploid pollen grains of autotetraploids they show the full competition but not dominance effects of their unmutated predecessors. This is evidence that the 'pollen' gene of the S complex is not entirely inactivated by the mutation, and supports the conclusion from the cytoplasmic effects described previously." (cf. Abst. 1535).

1537 LEWIS, D.
Gene-environment interaction: a relationship between dominance, heterosis, phenotypic stability and variability.
Heredity 1954 : **8** : 333–56.

The author explains the theoretical model upon which his experiments carried out on *Lycopersicon esculentum* to study F_1 phenotypic stability and F_1 nongenetic variability in relation to degree of dominance were based, gives a full account of the methods and results of these experiments and develops his theory of alternative genetic pathways. The main results and this hypothesis have been already described in a shorter paper (cf. *PBA*, Vol. XXIV, Abst. 775). F_1 variability is now discussed in relation to heterosis. According to the theory of alternative genetic pathways, high variability in heterotic F_1 hybrids relative to their parents indicates that heterosis is the result of favourable dominant genes. The data reported by the author and other investigators show that species with high relative variability in heterotic F_1 hybrids are inbreeders; heterosis dependent upon favourable dominants may therefore be a common type of heterosis in inbreeding plants where heterosis due to physiologically balanced heterozygosis (cf. *PBA*, Vol. XXIV, Abst. 23) would probably be rare.

1538 CARTER, T. C.
The estimation of total genetical map lengths from linkage test data.
J. Genet. 1955 : **53** : 21–28.

An estimate of the total map length of the house mouse was made by pooling the published data and some unpublished observations of the author on linkage and independence data of mutant genes. The estimate, $L = 16{\cdot}2 \pm 3{\cdot}5$ M is in good agreement with the figure $L = 19{\cdot}2$ M calculated by Slizynski from chiasmata counts. It is concluded that this agreement supports the current theory of crossing-over, and discounts the occurrence of sister-strand chiasma formation.

1539 BENNETT, J. H.
Linkage in inbreeding and polysomic inheritance,
Abstr. Diss. Univ. Camb. 1952–53 (1955) : p. 29.

"The dissertation constructs mathematical solutions of various problems arising in modern genetics.

"Several linear transformations of probabilities associated with inbreeding in the presence of lethal genes are considered. The rate of elimination of a single lethal gene is determined for a number of regular systems of inbreeding. Special attention is given to the balanced lethal configuration, the presence of which prevents the approach to homogeneity in part of the germplasm. The probability of a certain type of mating arriving at this balanced state is found in terms of the mutation rate. Consideration is given to the slowing down of the approach to homogeneity under various inbreeding schemes, caused by a nearly balanced configuration of closely linked lethal genes.

"The distribution of remanent heterogeneity upon inbreeding is examined. By combining a new approach with the method of junctions, the basis is provided for establishing the distribution of the length of chromosome map which is still of heterogeneous origin after many generations of inbreeding. The distribution is determined in terms of the modified Bessel function of the first kind.

"The remainder of the dissertation is concerned with problems in polysomic inheritance as follows. The junction approach is extended to the selfing of tetrasomic organisms. Several new features, absent in the case of disomics, are noted and discussed. The application of selfing and sib-mating to hexasomic organisms is considered, and the results are compared with those of inbreeding disomic and tetrasomic forms. A study is made of the linkage problem in hexasomic organisms. Gametic matrices are constructed for twelve classes of digenic genotypes, and their contribution to the information sought is examined." [Author's summary].

1540 SHULT, E. E. & LINDEGREN, C. C.
The hypothesis of chromosomal interference.
Nature, Lond. 1955 : **175** : p. 507.

It is pointed out that classical Mendelian analysis does not provide a basis for distinguishing between chromatid and chromosome interference as they affect recombination frequencies. Tetrad analysis provides an opportunity of discriminating between these two types of interference.

Relevant data from *Neurospora* and yeast may be summarized as follows. (1) Negative chromosomal interference occurs in *Neurospora*, i.e. the presence of one cross-over facilitates rather than inhibits the occurrence of another. (2) A mapping function, based on the assumption of a Poisson distribution of the number of cross-overs, has given additive distances in contrast to the otherwise nonadditive recombination data for yeast, indicating that cross-overs occur independently of one another in the regions involved.

1541 ZAMENHOF, S.
Studies on the chemistry of mutation.
Science 1954 : **120** : p. 791. (Abst.).

Experiments were carried out at Columbia University to study the relationship between change in chemical structure and change in function of one alleged hereditary determinant, DNA. The results suggested that removal of less than 0·5% of the total amino groups (and/or hypothetical H bonds to these groups) causes total inactivation of DNA. Replacement of more than 10% of methyl groups in the thymine component of DNA by bromine or iodine did not result in either inactivation or demonstrable mutation (no information is given on the experimental material). The cells with such DNA may grow at a normal rate and cannot be distinguished from normal ones. It therefore appears that certain changes in the structure of the DNA molecule may be without consequence but that maintenance of the original pattern of electric charges is essential. In nature, heritable change of this pattern may arise through change in the sequence and proportion of nucleosides in an integral DNA molecule, this alteration occurring as a fault during DNA reproduction. This process may be the chemical basis of mutation. The probability and the situation of the fault may, however, be determined by a preceding process of gene unstabilization.

1542 STADLER, L. J.
The gene.
Science 1954 : **120** : 811–19.

The difficulties involved in the study of the individual gene are discussed and it is emphasized that geneticists should exercise vigilance in bearing in mind the distinction between the operational definition of the gene and that of the hypothetical gene. Progress can only be achieved, it is stressed, by investigations of changes in specific genes, in spite of the various technical difficulties of such research. In the light of studies by the author and McClintock on maize genetics, the problems of analysing mutations are considered in relation to subliminal alteration, loss mutation, gene complexes and the apparent change or loss of a particular gene as the result of chromosomal changes affecting its expression.

1543 MEDINEC, V. D.
(Maternal inheritance of characters in the light of the theory of vegetative hybridization).
Uspehi Sovrem. Biol. (Advanc. in Mod. Biol.) 1952 : **33** : 273–86.

The thesis is put forward that mutual interaction between the ♀ and ♂ tissues in sexual hybrids is fundamentally the same as that which occurs between the stock and scion in vegetative hybrids. The maternal parent exercises its influence on the offspring from the time when the stigma exerts its selective action on the pollen grains which alight on it until the hybrid progeny ceases to derive nutrients from the endosperm. This is thought to account for the frequent predominance of the maternal characters in reciprocal hybrids. An explanation of the phenomenon by cytoplasmic inheritance is rejected. Evidence in support of the author's view was obtained from tomato crosses: Humbert 59 grafted on to Earliana 2 was pollinated with Earliana 2; reciprocal crosses were made by grafting Earliana 2 on Humbert 59 and pollinating with Humbert 59. In all cases the hybrids showed a greater resemblance to the variety which served as the stock.

1544 MECHELKE, F. & STUBBE, H.
Studien an mutablen Genen. I. *Antirrhinum majus* L. mut. *graminifolia*.
(Studies of mutable genes. I. *A. majus* L. mut. *graminifolia*).
Z. indukt. Abstamm.- u. VererbLehre 1954 : **86** : 224–48.

Two mutant strains (*gram*^{mut} lines a and b) were obtained at the Institute for Research on Crop Plants, Gatersleben, by ultraviolet and X irradiation, respectively. They are morphologically identical with Baur's *graminifolia* mutants (*gram*^{const}) but differ from the latter in possessing a marked tendency towards reverse mutation. When selfed, line a displayed a reverse mutation rate of 3·88% and line b 24·67%. Crosses between normal plants and *gram*^{mut} plants showed *Gram* to be incompletely dominant. Studies of pollen mother cells revealed pronounced chromosome stickiness at prophase in all the *graminifolia* mutants, this stickiness being more marked in *gram*^{mut} than in *gram*^{const}. In crosses between line b and *gram*^{const} plants a greater percentage of reverse mutations were obtained when *gram*^{mut} was carried by the pollen parent than when it was borne by the female.

EVOLUTION

1545 MULLER, H. J.
Life.
Science 1955 : **121** : 1–9.

The writer suggests that the gene was the starting point of life and made possible the subsequent evolution of the protoplasm and its increasingly complex organization. The mode of the physicochemical reproduction of the gene and of genic control over the composition and functions of the protoplasm are discussed in the light of recent advances in biochemical research. The possible paths along which plants and animals evolved are considered and speculations are made concerning the significance of eugenics for the future development of the human race.

1546 ANDERSON, E. & STEBBINS, G. L. (JUN.).
Hybridization as an evolutionary stimulus.
Evolution, NY 1954 : **8** : 378–88.

Paleontological work and studies of introgression reported on in recent years are interpreted as establishing that evolution does not proceed at a slow even rate but involves bursts of activity. Investigations on the evolution of plants under domestication and in habitats disturbed by man or other agents emphasize the importance of the role of hybridization in evolution. It is accordingly suggested that preceding the advent of man, hybridization in disturbed habitats was primarily responsible for bursts of evolutionary activity in the plant kingdom, the disturbances in the habitat being caused not only by changes in the inanimate environment but also by the appearance and disappearance of various types of animals.

1547 VASILJČENKO, I. T.
(The problem of the rate at which species evolve).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 852–66. [Russian].

This survey of research on evolution in plants deals principally with Russian work on the subject. The final conclusion reached is that "leaps," i.e. sudden evolutionary changes, may result from alterations in the external environment of the species but that changes due to "random explosions" do not occur.

1548 PUZANOV, I. I.
(Saltomutations and metamorphoses).
Bjull. mosk. Obšč. Ispyt. Prirod. (Bull. Moscow Soc. Nat.) 1954 : No. 4 : 67–79. [Russian].

This survey of theories on the evolution of species ranges from Aristotle to Lysenko and covers such subjects as metamorphosis, mutation, interspecific conversion and evolutionary leaps. The author is of the opinion that, under natural conditions, large numbers of new forms arise as the result of sudden changes in environment, the modifications thus caused being heritable. Although Lysenko's theory of evolution is rejected and reports by his followers on interspecific conversions discredited, certain cases of cereals producing grains of a different species are considered to be of interest, the author tending to agree with Turbin's explanation of these phenomena (cf. *PBA*, Vol. XXIII, Abst. 1634).

1549 TURBIN, N. V.
(For Darwinism in the theory of the origin of species).
Bjull. mosk. Obšč. Ispyt. Prirod. (Bull. Moscow Soc. Nat.) 1954 : No. 5 : 77 92. [Russian].

The writer repeats his arguments against Lysenko's evolutionary theories (cf. *PBA*, Vol. XXIII, Abst. 1634) and states that recently published articles have shown that all leading Soviet botanists reject Lysenko's new concepts of the species and of evolution. The assertion of Lysenko's supporters that classical Darwinism does not allow for qualitative changes is rebutted. It is thought that patrocliny and distant hybridization may be responsible for some of the phenomena which Lysenko explains by interspecific conversion. Lysenko's thesis that abrupt changes in external conditions may result in interspecific conversion conflicts with the facts known on the behaviour of economic species introduced into Russia from America and Asia.

1550 STUDITSKIĬ, A. N.
(Concerning the discussion on the origin of species).
Uspehi Sovrem. Biol. (Advanc. in Mod. Biol.) 1954 : **38** : 243–49. [Russian].

The critics of Lysenko in the *Botaničeskiĭ Žurnal* are charged with neo-Darwinism and said to have abandoned the biological principles accepted by them at the 1948 meeting of the Lenin Academy of Agricultural Sciences (cf. *PBA*, Vol. XVIII, Abst. 2000). In particular they are stated to accept overpopulation and intraspecific competition, to reject evolutionary leaps and to advocate polyploidy (cf. *PBA*, Vol. XXIV, Abst. 2627 and 2632). Lysenko's concept of the inheritance of acquired characters and of interspecific conversion is regarded as an important contribution to evolutionary theory.

*CYTOLOGY

1551 Ris, H. & Pontecorvo, G.
A cytological congress.
Science 1955 : **121** : 350–53.

The above writers each give comments upon the eighth Congress of the International Society for Cell Biology, held in Leiden, Netherlands, during September 1954. Among the main topics discussed were the biochemistry of gene action, nuclear and chromosome structure, cell division and mitotic poisons, the active cell surface and submicroscopic organization of the cytoplasm.

1552 Stern, H.
On the intranuclear environment.
Science 1955 : **121** : 144–46.

Investigations providing support for the view that the metabolic activities of the chromosomes take place under anaerobic conditions are surveyed. Such an exclusion of oxidative processes may have advantages from the point of view of the survival and stability of the genetic complex.

1553 Dekker, C. A. & Schachman, H. K.
On the macromolecular structure of deoxyribonucleic acid : an interrupted two-strand model.
Proc. nat. Acad. Sci. Wash. 1954 : **40** : 894–909.

From a general analysis of the literature dealing with the structure of DNA, in particular the reports on the effects of heat degradation, and from their own researches on the kinetics of degradation with deoxyribonuclease, the authors agree with the twin-helical structure for DNA proposed by Watson and Crick (cf. *PBA*, Vol. XXIV, Abst. 57). They are of the opinion, however, that the two polynucleotide strands are not continuous, but are interrupted about every 50 nucleotides, the breaks in each of the two strands being staggered relative to one another.

1554 Dunn, D. B. & Smith, J. D.
Occurrence of a new base in the deoxyribonucleic acid of a strain of *Bacterium coli*.
Nature, Lond. 1955 : **175** : 336–37.

When the thymine-requiring strain 15T$^-$ is grown under conditions of thymine deficiency or in the presence of substituted thymines, a new nucleic acid base, 6-methylaminopurine, replaces thymine in the deoxyribonucleic acid molecule. It is difficult to reconcile this finding with Watson and Crick's theory of DNA replication (cf. *PBA*, Vol. XXIV, Absts. 57 and 58).

1555 Smirnova, V. A.
(The migration of nuclei in some mosaic-infected monocotyledons).
Bjull. mosk. Obšč. Ispyt. Prirod. (Bull. Moscow Soc. Nat.) 1954 : No. 5 : 71–76. [Russian].

Nuclei were frequently observed to migrate from cell to cell in the epidermis of diseased onions. These nuclei tended to fuse with other nuclei. Migration of nuclei also occurred in diseased orchids and tulips. It was shown that, in the tulip, the nuclei passed through the plasmodesmata.

1556 Gottschalk, W.
Vergleichend cytologische Untersuchungen an den Ruhe- und Arbeitskernen verschiedener pflanzlicher Gewebe. **(Comparative cytological investigations of the resting and dividing nuclei in various plant tissues).**
Planta 1955 : **45** : 147–65.

Cytological research on the meristematic tissues of the tomato, *Physalis philadelphica* and *Datura suaveolens* at the Max Planck Institute for Breeding Research, Neuhof, Germany, showed that the nucleus, which is elongated in undifferentiated cells, becomes increasingly oval and, in relation to the total size of the cell, somewhat smaller, as differentiation proceeds. Chromocentres were found only in the resting nuclei of cells that were about to divide; their frequency diminished in direct proportion to the degree of differentiation of the cells.

1557 Løvtrup, S.
Nucleinsyrernes kemiske sammensætning og deres lokalisering i cellerne. **(The chemical composition of the nucleic acids and their localization in the cells).**
Nat. Verd., Kbh. 1954 : **38** : 193–201.

A simple account is given of the techniques by which deoxyribonucleic acid has been located in chromosomes and ribose nucleic acid in chromosomes, nucleoli, cytoplasm and cytoplasmic inclusions.

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* General studies, see also individual crops.

1558 Løvtrup, S.
Nucleinsyrernes biologiske betydning. **(The biological importance of the nucleic acids).**
Nat. Verd., Kbh. 1954 : **38** : 305–12.

In this popular account of the nucleic acids, the evidence suggesting that DNA is, both quantitatively and functionally, a major component of genic material is outlined.

1559 Fujii, T.
Presence of zinc in nucleoli and its possible role in mitosis.
Nature, Lond. 1954 : **174** : 1108–09.

By means of the diphenylthiocarbazone (dithizone) reaction, evidence has been obtained that the nucleoli of fertilized sea-urchin eggs, starfish oocytes and staminal hair cells of *Tradescantia* contain zinc. Observations on sea-urchin eggs suggested that upon initiation of mitosis the zinc present in the nucleolus passed into the chromosomes and possibly also into the prometaphase spindle.

1560 Vaarama, A.
Cytological observations on *Pleurozium schreberi*, with special reference to centromere evolution.
Ann. bot. Soc. zool.-bot. fenn. Vanamo 1954 : **28** : No. 1 : 1–59.

The evolution of different centromere and chromosome types is discussed in detail. According to the author's hypothesis the most primitive chromosome type is a single block of chromatin with a diffuse centromere. Restriction of kinetic activity to the block ends and subsequent fusion of one or more blocks lead first to the formation of chromosomes with either multiple or semilocalized centromeres, as in *Ascarus megalocephala* and *P. schreberi*, respectively, and finally, by the increased activity of one centromeral element at the expense of the others, to the development of the most advanced forms with completely localized centromeres.

1561 Gottschalk, W. & Peters, N.
Die Chromosomenstruktur als Kriterium für Abstammungsfragen bei Tomate und Kartoffel. **(The structure of the chromosomes as a criterion in problems concerning the origin of tomatoes and potatoes).**
Z. Pflanzenz. 1954 : **34** : 71–84.

At the Max Planck Institute for Breeding Research, Neuhof, Germany, cytological studies of the chromosomes of wild and cultivated forms of tomato and potato indicated that morphological differences, sufficient to distinguish one species from another, existed in the chromosomes during pachytene. Data on interspecific variations noted in the length of the chromosomes, position of the centromere in the heterochromatic zone, number of macrochromomeres present, size of the heterochromatic regions and occurrence of isolated macrochromomeres are presented. The wild species *Lycopersicon pimpinellifolium*, *L. humboldtii* and *L. tomatillo* appeared from these studies to be more closely related to the cultivated tomato than were *L. hirsutum* or *L. peruvianum*. *Solanum tuberosum* and *S. andigenum* closely resembled each other in the structure of their chromosomes, as did also *S. antipoviczii*, *S. ajuscoense*, *S. tlaxcalense* and *S. malinchense*. The chromosomes of *S. fendleri* differed markedly from the chromosomes of both the above-mentioned groups of potato.

1562 Tischler, G.
Das Problem der Basis-Chromosomenzahlen bei den Angiospermen-Gattungen und -Familien. **(The problem of the basic chromosome numbers of genera and families in angiosperms).**
Cytologia, Tokyo 1954 : **19** : 1–10.

The significance of chromosome number in tracing the evolution of angiosperms is discussed and the literature on the basic chromosome numbers of different families is surveyed.

1563 Delay, C.
Nombres chromosomiques chez les cryptogames (1938 à 1953). [**Chromosome numbers in the cryptogams (1938 to 1953)**].
Rev. Cytol., Paris 1954 : **14** : No. **2** : 59–106.

Tabulated data are presented on chromosome numbers established since Tischler's synopsis published in 1948, of chromosome numbers in the cryptogams.

1564 Beatty, A. V. & Beatty, J. W.
Physiological effects of X radiation in various percentages of oxygen on *Tradescantia* microspores.
Amer. J. Bot. 1955 : **42** : 288–92.

Radiation effects consisting of (1) despiralization of the chromosomes in early prophase and early mid-prophase and reversion of these stages to very early prophase, (2) retardation in the rate of division and (3) chromosome clumping were more pronounced and of greater duration when X-ray treatment for 4 minutes at the rate of 50 r. per min. was applied in 100% oxygen than in air or 5% oxygen. These effects were least when irradiation took place in helium.

Plotting of physiological effects and of chromosomal aberrations against oxygen concentration gave closely similar graphs.

1565 DEYSSON, M.
Influence de l'adénine sur la division des cellules végétales. (**Influence of adenine on the division of plant cells**).
Bull. Soc. bot. Fr. 1954 : **101** : 412–20.

Weak concentrations of adenine were found to stimulate cell division and growth in experiments on seedling peas and onion root-tips. Stronger concentration inhibited mitosis and had a pronounced mitoclastic action. Chromosome fragmentation and bridges were observed.

1566 BRADLEY, M. V. & CRANE, J. C.
The effect of 2,4,5-trichlorophenoxyacetic acid on cell and nuclear size and endopolyploidy in parenchyma of apricot fruits.
Amer. J. Bot. 1955 : **42** : 273–81.

Spraying with 2,4,5-trichlorophenoxyacetic acid at the beginning of pit hardening caused considerable increases in cell and nuclear size and a high degree of endopolyploidy but stimulated little if any cell division in the fruit parenchyma.

1567 FUJII, K. & YASUI, K.
On the mechanism of nuclear division and chromosome arrangement. (A symposium). III. Studies on nuclear division *in vivo*. B. Meiotic processes from the first prometaphase to the end of the second division of the PMC.
Cytologia, Tokyo 1954 : **19** : 54–76.

On the basis of *in vivo* observations on meiosis, chiefly in *Fritillaria*, chromosome behaviour during metaphase and anaphase is interpreted as being due to the electrical forces of repulsion or attraction between chromosomes and poles, and, at anaphase, also to the effects of the polarization of the spindle substance in combination with the mutual repulsion of the chromosomes passing to the same pole (cf. *PBA*, Vol. XXIV, Abst. 797).

1568 WOLFF, S.
On the rejoining of radiation-induced chromosome breaks in *Vicia faba*.
Radiation Res. 1954 : **1** : p. 567. (Abst.).

Previous studies had shown that chromosome breaks induced by *in vacuo* irradiation of the seed of *V. faba* remain open for ½ hr. and then rejoin. Dose-fractionation experiments were carried out, seeds *in vacuo* being exposed to 600 r. of X rays and, 75 minutes later, to a second dose in air. The first breaks rejoined before the second irradiation was given. If, however, after the first dose, the temperature was immediately reduced to 0° C, the breaks stayed open and interacted with the breaks produced by the second irradiation. Similar results were obtained by treating the seed with 2×10^{-3} M KCN immediately after the first dose. The results are interpreted as providing support for the view that an enzyme system is involved in the biosynthesis necessary for rejoining but the exact role of this system is not yet known.

1569 GILES, N. H. & TOBIAS, C. A.
Effect of linear energy transfer on radiation-induced chromosome aberrations in *Tradescantia* microspores.
Science 1954 : **120** : 993–94.

Investigations were carried out on the effects of irradiating *Tradescantia* inflorescences with deuterons having high and low linear energy transfer (LET), isochromatid and chromatid aberrations being scored. The frequency of either type of aberration was greater at the higher rate of LET (5–30 kve/μ). The relative effectiveness in the production of chromatid aberrations was approximately 2·7 and that for isochromatids 4·5. A comparison was made of the frequency of isochromatid aberrations induced by (1) 190-Mev deuterons, (2) 380-Mev α particles and (3) 100-Kv X rays, the last according to the data summarized by Lea (cf. *PBA*, Vol. XVII, p. 350), all these radiations having approximately equal LET. The comparison indicated that the important factor in determining radiobiological effectiveness is not the type of ionizing particle but rather the rate at which energy is dissipated along the particle path.

1570 GRAY, L. H.
Some characteristics of biological damage induced by ionizing radiations.
Radiation Res. 1954 : **1** : 189–213.

Mainly with respect to induced changes in chromosome structure in plants and animals, the author analyses the differences between chemical substances and ionizing radiations and between different kinds of radiation in their effects and mode of action. Assuming that the biological effects of ionizing radiation, at least in the case of chromosome breakage, are produced by the interaction between the products formed along the path of a single ionizing particle and the constituents of the immediately surrounding protoplasm, he further considers the results of investigations on the influence of oxygen, protective substances and carbon monoxide upon radiobiological damage, discussing the possible chemical mechanisms which may be responsible for initiating chromosome alteration and other changes.

1571 Kaufmann, B. P. & Das, N. K.
Production of mitotic abnormalities by ribonuclease.
Proc. nat. Acad. Sci. Wash. 1954 : **40** : 1052–56.

Treatment of growing roots of *Allium cepa* and *Lilium tigrinum* with solutions of crystalline ribonuclease stimulated mitotic activity in polyploid cells in the region of cell elongation, and induced various chromosomal aberrations in the meristematic cells, such as fragmentation, excessive contraction, aneuploidy, polyploidy, multipolar spindles and multinucleate cells. The high degree of polyploidy in the stimulated cells in the region of elongation suggested that the polyploid condition had been attained prior to the treatment. It is possible that the production of mitotic abnormalities by agents other than ribonuclease may be partly attributable to ribonucleoprotein degradation.

1572 Kurabayashi, M.
Denaturation of chromatin and its related phenomena observed in somatic tissues under low temperature.
Jap. J. Bot. 1954 : **14** : 349–64.

A high frequency of chromosome breaks, including breaks at the kinetochore and in differential segments was observed in *Trillium kamtschaticum* after exposure to low temperatures. Similar treatment of *Paris tetraphylla* resulted in numerous breaks throughout the chromosome complement. The course of denaturation of the chromatin of the micronuclei frequency produced in *T. kamtschaticum* from the affected chromosomes is described. It is believed that, in some cases, affected chromosomes migrate into normal nuclei, where they persist in a heterochromatized condition.

1573 Castro, D. de & Mello-Sampayo, T.
Uma série poliploide em *Luzula purpurea*. (**A polyploid series in *L. purpurea***).
Agron. lusit. 1954 : **16** : 111–14.

Plants with $2n + 1$, $4n + 2$ and $5n$ have been obtained with colchicine treatment, in addition to the $2n + 2$, $3n$, $3n + 1$, $3n + 2$, $4n$ and $4n + 1$ already reported (cf. Abst. 695). The different chromosomal types differed widely in vigour and morphology and are illustrated; the triploid is the tallest and the tetraploid the most robust, the $3n + 2$ plants showed the most rapid germination and the $2n + 1$, $2n + 2$ and $3n + 2$ were the earliest in flowering. The pentaploid did not seem to be less regular than the tetraploid in meiosis.

1574 Kaufmann, B. P. & Das, N. K.
The role of ribonucleoproteins in the production of mitotic abnormalities.
Chromosoma 1955 : **7** : 19–38.

The results of experiments at the Department of Genetics, Cold Spring Harbour, NY, on the effect of varying concentrations of ribonuclease on mitosis in the meristematic cells of onion and *Lilium* root-tips are reported. Among the symptoms observed were enlargement of the nucleoli, excessive contraction, stickiness, adhesion and clumping of chromosomes, and the production of aneuploid and polyploid chromosome complexes, tripolar and multipolar spindles and binucleate and multinucleate cells. Chromosome fragmentation was rare. The implications of these results are discussed with reference to the production of aberrations by other agents.

1575 Sharma, A. K. & Sen, S.
Study of the effect of water on nuclear constituents.
Genet. iber. 1954 : **6** : 19–28.

Root tips of *Allium cepa* and of species of *Crinum*, *Amaryllis*, *Vallisneria* and *Hydrilla* were treated with tap, distilled or redistilled water at different temperatures and for various periods. Treatment with tap water for only half an hour at 12–16° C. resulted in chromosome fragmentation; at room temperature, treatment for a longer period was required for the expression of this effect. The aberrations caused by treatment with distilled water are thought to be probably due to the presence of a trace of Cu derived from the metallic retort used. Redistilled water had a slight effect upon mitosis; it is suggested that either redistillation was imperfect or any change in the normal environment of a tissue causes metabolic disturbances and consequent cytological irregularities, regardless of the chemical composition of the medium. The bearing of these results upon the interpretation of data from experiments on water-soluble mutagens is considered.

1576 Lona, F.
Effetti citologici della podofillina su apici radicali di *Allium Cepa*. (**Cytological effects of podophyllin on root tips of *A. Cepa***).
Nuovo G. bot. ital. 1953 : **60** : 341–42.

Podophyllin brings about a form of c-mitosis when applied to onion root tips; its most characteristic effect is inhibition of centromere division.

1577 Macfarlane, E. W. E.
Some phenyl mercurials as polyploidogenic and radiomimetic agents for plants, compared with colchicine, with remarks on antagonism.
Rev. Cytol., Paris 1954 : **15** : 139–46.

The effect of phenylmercuric hydroxide and phenylmercuric nitrate on cell division in the root tips of *Allium cepa* was investigated. These substances, which have a similar thermodynamic activity to colchicine, bring about mitotic inhibition, produce a higher frequency of radiomimetic effects on the chromosomes than colchicine, but are much less effective in inducing polyploidy.

1578 Wijsman, R. A.
A modification of the mathematical theory of chromosomal rearrangements.
J. Genet. 1955 : **53** : 167–71.

Lea and Catcheside have given the probability of complete restitution or interchange of r radiation-induced chromosome breaks as $P_2(r) = qr$, where q is a constant between 0 and 1. This formula is criticized as not taking into full account the reduction in the probability of rejoining once two or more ends have rejoined. The revised formula

$$P_2(r) = \frac{1.3.5\ldots\ldots(2r-1)}{1.(1+2q)\,(1+4q)\ldots[1+(2r-2)q]}\,qr$$

is proposed.

1579 Bora, K. C.
The influence of temperature on the production of chromosome aberrations by fractional X-ray doses in the microspores of *Tradescantia bracteata*. I. Effect at 25° C.
J. Genet. 1955 : **53** : 29–40.

X-ray fractionation experiments at 25° C provided no evidence of recovery in the frequency of breakage characteristic of unfractionated doses, even with an interval of 32 hours separating the doses, and confirmed the previous conclusion reached by the author and a number of other investigators that most of the chromosome exchanges occur within a short time after irradiation. It is suggested that high intensity of radiation is more effective in slowing down the rate of mitosis than low intensity. The speed of recovery of the microspores from the inhibitory effect on mitosis depends upon radiation intensity and temperature. The quantitative effect of the second fractional dose is dependent upon the mitotic inhibition caused by the first dose.

1580 Bora, K. C.
The influence of temperature on the production of chromosome aberrations by fractional X-ray doses in the microspores of *Tradescantia bracteata*. II. Effects at 10° C.
J. Genet. 1955 : **53** : 41–48.

No recovery in the frequency of chromosome breakage characteristic of unfractionated X-irradiation was detected when the two X-ray doses, given at an intensity of 170 r./min., were separated by 1–32 hr. The fractionation effect was independent of the temperature (25° and 10° C) at the time of irradiation and during the interval, and also independent of the nuclear stage at which irradiation occurred. The chief observable effects of low temperature are classified as follows: (1) decrease in rate of cell division, (2) prolongation of the duration of breakage and (3) a greater frequency of reunion than restitution. Either low temperature or X-irradiation has an inhibitory effect upon mitosis. When these two treatments are combined, this effect is greatest with fractionated X-ray dosage and with long intervals between the two equal fractions. The yield of X-ray induced aberrations appeared to be influenced by seasonal variation.

1581 McLeish, J.
The consequences of localised chromosome breakage.
Heredity 1954 : **8** : 385–407.

Using root tips of *Vicia faba*, investigations were carried out on the localized breakage induced by 8-ethoxycaffeine (EDC) and maleic hydrazide (MH) and on the effects of this breakage in succeeding cell generations. EDC and MH induce breakage chiefly in the nucleolar constriction and heterochromatin respectively, characteristic acentric fragments and micronuclei being produced. Four main groups of acentrics and micronuclei could be distinguished according to the combinations of euchromatin, heterochromatin and nucleolar organizers. The size of the nucleoli in nucleolar micronuclei was influenced by competition between their organizers and by the size of the nuclei. The presence of heterochromatin was apparently the decisive factor for the survival of nucleolar micronuclei. Nucleolar micronuclei "co-operate with the main nuclei during interphase and become synchronized with them during prophase." Nucleolar types of acentrics surviving and reproducing after MH treatment have proved to be reliable cytological markers in the X_2 and X_3 cell-generations, indicating the time of occurrence of deferred breakage and secondary reunion. The regular pattern of breakage observed in X_1 mitoses was thus found to be repeated in X_2 and X_3 divisions for at least 28 days; probably the chemical persists in the cells. Broken ends carried through from the X_1 and X_2 reunited with synchronous, as well as deferred, breaks. During the X_1, SR rearrangements were frequent but R″ rearrangements were rare; in the X_2, the converse held.

1582 SPARROW, A. H. & SPARROW, R. C.
The formation of polyploid microspores in *Trillium erectum* following X-ray treatment at first meiotic metaphase.
Radiation Res. 1954 : **1** : p. 229. (Abst.).

X-ray dosage and the amount of polyploidy induced in cells irradiated at metaphase I were directly related. Polyploidy generally resulted from the destruction or inactivation of the spindle. In some cases, when the spindle was not inactivated, persistence of chromatin bridges led to the formation of dumbell-shaped nuclei at telophase; these appeared as spherical polyploid nuclei at late interphase.

1583 SPASOJEVIĆ, V.
(**Mutant power of "Astra-Lux" lamp radiation. 1. Effect of "warm" infrared radiation on the meiotic process in *Antirrhinum majus***).
Zborn. Rad. Inst. Fiziol. Razbić. Genet. Selekc. (Rec. Trav. Inst. Physiol. Développ. Génét. Sélect.)/Rev. Wk. Inst. Physiol. Develop. Genet. Select., Beograd 1952 : **25** : No. 2 : 153–71. [Serbian].

Anomalous divisions in *A. majus*, caused by infrared irradiation in conjunction with high temperatures are described. It is thought that the conditions mainly responsible for producing polyploidy effects are stickiness and partial or complete disruption of spindle functions.

1584 SCHWANITZ, F.
"Tylose" und "Aerosil" als Hilfsmittel bei der Colchicinbehandlung. (**"Tylose" and "Aerosil" as aids in colchicine treatment**).
Züchter 1955 : **25** : 60–61.

These two substances have much the same properties as tragacanth (cf. PBA, Vol. XX, Abst. 773) but possess the advantage that they are not so susceptible to bacterial decomposition.

1585 YAMASAKI, M., GOTO, T. & YOKOTA, M.
(**On the effect of temperature during colchicine treatment on the frequency of induced polyploidy**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **4** : No. 1 : 9–13. [Japanese].

Five different colchicine treatments were each carried out at (1) 5–7° C, (2) 15–20° C and (3) 25–30° C. The material used was radish, buckwheat and *Phaseolus angularis*. For every treatment, the rate of induced polyploidy was highest at the lowest temperature.

Induced tetraploid radish strains were more susceptible to the toxic action of $KClO_3$ than the parent diploids.

1586 SUBRAMANIAM, M. K. & ROYAN, S.
On the need for a study of phaenocytology.
Curr. Sci. 1954 : **23** : 351–54.

Investigations providing evidence of the occurrence of endopolyploidy in differentiating cells and of somatic reduction in cells undergoing dedifferentiation are reviewed and the need for further study of the relationship between nuclear changes and histogenesis, differentiation and dedifferentiation is stressed. The term phaenocytology is proposed for the branch of cytology dealing with such problems.

1587 MAKAROV, S. N.
(**Distinguishing the sex of plants by means of their vegetative and biological characteristics**).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1954 : No. 17 : 43–48. [Russian].

Investigations on the vegetative characteristics of young diecious plants and of some diecious variants of normally monecious species are reported, with a view to facilitating the determination of the sex of such plants prior to flowering. Female trees of *Populus tremula* appeared to be more resistant to heart rot than male trees.

1588 SHARMA, A. K. & MOOKERJEA, A.
Paradichlorobenzene and other chemicals in chromosome counts.
Stain Tech. 1955 : **30** : 1–7.

Of the prefixing agents tested, paradichlorobenzene was the most satisfactory, proving to be particularly useful in the case of plants with high chromosome numbers. A method for making temporary smears is described, consisting of treatment of root tips with a saturated aqueous solution of paradichlorobenzene for 3 hours at 12–16° C, followed by heating in a 9 : 1 mixture of 2% acetoorcein solution and

N HCl for 3–4 sec. just to boiling, and then smearing in 1% acetoorcein solution.

1589 Chambers, T. C.
Use of snail stomach cytase in plant cytology.
Nature, Lond. 1955 : **175** : p. 215.

Attention is drawn to the value of Fabergé's technique in which use is made of snail stomach cytase for maceration (cf. *PBA*, Vol. XV, Abst. 1334). With certain refinements, the technique has given preparations in which good chromosome counts could be made in material which has given unsatisfactory results when prepared by the usual methods.

1590 Beeks, R. M.
Improvements in the squash technique for plant chromosomes.
El Aliso 1955 : **3** : 131–34.

Details are given of a technique found useful in the case of plants possessing pollen mother cells which are few in number, small in size and adhesively retained in small anther sacs. The technique involves maceration of the anthers in 5% HCl and mounting in Hoyer's medium. *Secale* was among the genera examined.

*BOTANY

1591 Gupalo, P. I.
(**Ways for promoting the theory of ontogenesis in plants**).
Uspehi Sovrem. Biol. (Advanc. in Mod. Biol.) 1954 : **38** : 111–21. [Russian].

This paper refers to articles by Glinka and Dvorjankin (cf. *PBA*, Vol. XXIV, Absts. 82 and 83). Various reasons are advanced in support of Glinka's plea for a new general biological theory. This should be based upon a synthesis of the principles advocated by Lysenko and Krenke, including those relating to the problem of vitality of organisms.

1592 Linskens, H.
Physiologische Untersuchungen der Pollenschlauch-Hemmung selbststeriler Petunien. (**Physiological investigations on the inhibition of the pollen tube in self-sterile petunias**).
Z. Bot. 1955 : **43** : 1–44.

At the Institute of Botany of Cologne University, the pollen tube was shown to derive the water, carbohydrates and sugars necessary for its growth from the tissue of the style. Self sterility is attributed to the production by the style of antibodies that prevent the assimilation of nutrients by the pollen tube.

DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

1593 Mothes, K.
Bakterien, Pilze und Algen: ein neuer Typ von Kulturpflanzen. (**Bacteria, fungi and algae: a new form of crop plant**).
Kulturpflanze, Berlin 1954 : **2** : 237–55.

An account of the potential value of bacteria, fungi and algae as sources of food and raw materials is presented and the possibility of breeding new strains, either by selection or the induction of mutations, to give higher yields of carbohydrates, fats and proteins is discussed.

1594 Jacob, F. & Wollman, É.
Induction spontanée du développement du bacteriophage λ au cours de la recombinaison génétique, chez *Escherichia coli* K12. (**Spontaneous induction of the development of bacteriophage λ in the course of genetic recombination in *E. coli* K12**).
CR Acad. Sci., Paris 1954 : **239** : 317–19.

All the progeny of a cross between an F^+ lysogenic strain and an F^- nonlysogenic strain were found to possess the lysogenic properties of the F^+ parent but were similar in all other respects to the F^- parent (cf. *PBA*, Vol. XXIV, Abst. 1639). This phenomenon is attributed to the transfer of prophage λ from the lysogenic to the nonlysogenic bacteria in the course of recombination.

1595 Frédéricq, P.
Transduction génétique des propriétés colicinogènes chez *Escherichia coli* et *Shigella sonnei*. (**Genetic transduction of colicinogenic characters in *E. coli* and *S. sonnei***).
CR Soc. Biol., Paris 1954 : **148** : 399–402.

At the Institute of Bacteriology of the University of Liège, the progeny of noncolicinogenic strains of *E. coli* and *S. sonnei* inherited the colicinogenic properties of other strains when grown in mixed cultures but were otherwise similar to the initial noncolicinogenic parent. The transduction of colicinogenic properties also took place when colicinogenic strains of *E. coli* were grown with noncolicinogenic strains of *S. sonnei* and *vice versa*.

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* General studies, see also individual crops.

1596 FRÉDÉRICQ, P. & BETZ-BAREAU, M.
Participation de 3 parents à la constitution génotypique de recombinants d'*Escherichia coli* K12. (**Participation of three parents in the genotypic constitution of recombinants of *E. coli* K12**).
CR Soc. Biol., Paris 1954 : **148** : 1274–76.

The results of experiments at the Bacteriological Institute, Liège University, on the possibility of simultaneously combining the characters of two colicinogenic strains of *E. coli* and, in addition, the noncolicinogenic properties of a third strain, are reported. The three parents employed consisted of two F^+ strains susceptible to phage T1 and colicin E_1 respectively and an F^- strain that was both nonlysogenic and noncolicinogenic. Many of the progeny of this triple cross possessed the morphological characters of the two F^+ parents together with the nonlysogenic and noncolicinogenic properties of the F^- strain.

1597 FRÉDÉRICQ, P.
Rôle éventuel des propriétés lysogènes dans la transduction des propriétés colicinogènes chez *Escherichia coli*. (**The possible role of lysogenic properties in the transduction of colicinogenic properties in *E. coli***).
CR Soc. Biol., Paris 1954 : **148** : 624–27.

It is recalled that previous research has shown that noncolicinogenic strains of *E. coli* acquire colicinogenic properties when grown in mixed cultures with colicinogenic strains (cf. *PBA*, Vol. XXIV, Abst. 1641). More recent experiments at the Institute of Bacteriology, Liège University, have demonstrated that the transfer of colicinogenic properties takes place independently of the transfer of lysogenic characters.

1598 FRÉDÉRICQ, P.
Intervention du facteur de polarité sexuelle F dans la transduction des propriétés colicinogènes chez *Escherichia coli*. (**The intervention of the factor F for sexual polarity in the transduction of colicinogenic properties in *E. coli***).
CR Soc. Biol. 1954 : **148** : 746–48.

In experiments at Liège University on the transfer of colicinogenic properties from colicinogenic to noncolicinogenic strains of *E. coli*, it was observed that, whereas crosses between F^+ and F^+ and between F^+ and F^- strains were successful, no genetic recombination took place when both strains were of the F^- type.

1599 KUNICKI-GOLDFINGER, W.
Zmienność u bakterii. (**Variation in bacteria**).
Acta Microbiol. Polon. 1954 : **3** : 199–347.

A survey and discussion of the world literature relating to variation in bacteria is presented, based on 784 references.

1600 DEMEREC, M.
What makes genes mutate?
Proc. Amer. phil. Soc. 1954 : **98** : 318–22.

The author surveys the main results of his experiments on spontaneous and induced mutations in *Escherichia coli*. Using different chemicals and types of radiation, it has been found that a particular gene may react strongly to one mutagen but only slightly or not at all to treatment with another; five out of approximately 40 genes for nutritional deficiencies have been found to be mutagen stable. It is postulated that the action of a mutagen is specific but indirect, bringing about some cytoplasmic or nuclear change which in turn affects certain physiological processes of the cell and thereby influences the genes, each of which exhibits a specific type of response to the cell conditions created by the mutagen. Experiments with $MnCl_2$ and ultraviolet radiation indicated that subsequent exposure of the cells to certain conditions, such as a change in temperature, may modify the genetic effects of either of these mutagens. This modification may be accomplished only during the period preceding the first division of the treated cells, suggesting that one division is sufficient for the restoration of the normal metabolism of the cell (*PBA*, Vol. XXIII, Abst. 1606).

1601 TREFFERS, H. P., SPINELLI, V. & BELSER, N. O.
A factor (or mutator gene) influencing mutation rates in *Escherichia coli*.
Proc. nat. Acad. Sci. Wash. 1954 : **40** : 1064–71.

Preliminary experiments have suggested that a variant of strain K12 contains a gene causing a rate of mutation ten to several hundred times that detected in the control strains. This gene increased the rate of mutation to resistance to diverse agents, including streptomycin, chloramphenicol, sodium fluoride and certain T phages; it also caused increases in the rate of mutation to the capacity to ferment sugars, particularly xylose, and also in the rate of reverse changes from such capacities. The rates of mutation to the different conditions did not increase uniformly, and in one case, resistance to T2, the mutation rate was hardly affected.

1602 KELMAN, A.
A differential medium for the detection of mutants of the Granville wilt bacterium.
J. Elisha Mitchell sci. Soc. 1954 : **70** : p. 127. (Abst.).

Use of a glucose-peptone-casein hydrolysate medium containing 0·005% triphenyl tetrazolium chloride has facilitated the study of (1) the relative percentages of normal and mutant types of *Pseudomonas solanacearum* and (2) population changes following growth in inoculated host plants and in various media. After 36 hours of growth at 32° C in such a medium, wild-type colonies are entirely white or white with a small light red centre whereas mutant colonies appear dark red with a narrow white border. Mutants with this coloration have proved to be less pathogenic than the wild type.

1603 BELJANSKI, M.
Isolement de mutants d'*Escherichia coli* streptomycinorésistants dépourvus d'enzymes respiratoires. Action de l'hémine sur la formation de ces enzymes chez le mutant H_7. **(Isolation of streptomycin-resistant mutants of *E. coli* devoid of respiratory enzymes. The action of hemin on the formation of these enzymes in the mutant H_7).**
CR Acad. Sci., Paris 1955 : **240** : 374–77.

The mutant H_7, distinguished by its resistance to streptomycin and by the inactivity of its respiratory system, was obtained from the streptomycin-susceptible "mondo" strain of *E. coli*. The addition of hemin to the culture resulted in an increase in growth rate and respiratory activity.

1604 WAINWRIGHT, S. D. & NEVILL, A.
Modification of the biological effects of ultraviolet irradiation by post-irradiation treatment with iodoacetate and peptone.
J. gen. Microbiol. 1955 : **12** : 1–12.

"A study has been made of the effects of post-irradiation treatment of ultraviolet irradiated spores of *Streptomyces* sp. strain T12 with distilled water, iodoacetate and a peptone medium.

"At doses exceeding 400 ergs/mm.^{2} (which exceed that corresponding to the peak of the dose/variant-frequency curve) treatment in distilled water results in increases in both the proportion of survivors and the frequency of variants amongst the survivors. Treatment with iodoacetate caused larger increases, whereas treatment with peptone medium suppressed the increases. A partial resolution of the lethal and mutagenic effects of the radiation was obtained at lower doses, for it was possible to modify the proportion of survivors without changing the variant frequency."
[Authors' summary].

1605 WAINWRIGHT, S. D. & NEVILL, A.
Induction of provariants as a function of dose of ultraviolet radiation.
J. gen. Microbiol. 1955 : **12** : 13–24.

"With spores of *Streptomyces* sp. strain T12 irradiated at doses of ultraviolet light up to 1000 ergs/mm.^{2} and then incubated in distilled water, both the proportion of survivors and the proportion of induced variants amongst the survivors rose progressively to maximal values as the period of incubation was increased. The maximal proportion of variants was attained before the maximal proportion of survivors. The rate of increase of survival and the final level of survival were enhanced in the presence of iodoacetate. The rate of increase of variant frequency was enhanced by iodoacetate, but the maximal proportion of variants was not raised. The changes of variant frequency resulting from post-irradiation treatments do not appear to be due to selectively greater increases in the survival of variant spores than of nonvariant spores." [Author's summary].

1606 NEWCOMBE, M. B.
An exceptional X-ray dose-mutation relationship.
Radiation Res. 1954 : **1** : p. 225. (Abst.).

Deviations from linearity in the dose-effect curves for X-ray-induced genetic changes in which two successive treatments have an effect greater than an additive one can be interpreted on the assumption that two or more separate events, e.g. ionizations, are required to produce the effect. Large deviations in the opposite direction, with two successive treatments having an effect less than an additive one, have been found in the case of variants of *Streptomyces*, both with high and low doses of X rays. Such discrepancies cannot be an outcome of the number of events involved. They can be most satisfactorily interpreted by assuming that a semistable condition is induced and that a further X-ray dose causes an increase in the likelihood of reversion to normal stability.

1607 RIZKI, M. T. M.
Diffusion of chromogenic inductors of *Serratia marcescens*.
Proc. nat. Acad. Sci. Wash. 1954 : **40** : 1057–60.

Diffusible substances from some colour variants are capable of inducing pigment changes in other colour variants, such changes being phenotypic. The interactions among 12 ultraviolet-induced variants and the normal HY strain are described.

1608 Jacob, F. & Wollman, É.
Lysogénie et recombinaison génétique chez *Escherichia coli* K12. (**Lysogeny and genetic recombination in *E. coli* K12**).
CR Acad. Sci., Paris 1954 : **239** : 455–56.

A study of the progeny of crosses between two lysogenic mutants, Hfr and F^- of *E. coli* 'K12' showed that the prophage λ is situated on the segment TL Lac_1. In crosses between lysogenic and nonlysogenic strains, the spontaneous induction of the prophage suppresses those zygotes that have received the prophage λ. The occurrence in the recombinants of characters linked to the prophage λ is thereby modified.

1609 Jacob, F. & Wollman, É.
Localisation du prophage sur le chromosome. Son intervention dans le taux de ségrégation apparent des recombinants d'*Escherichia coli* K12. (**Position of the prophage on the chromosome. Its influence on the apparent segregation ratio of recombinants of *E. coli* K12**).
CR Soc. Biol., Paris 1954 : **148** : 1501–04.

Some nonlysogenic mutants of *E. coli* 'K12' were rendered lysogenic by infection with phage λ; in all these cases, the prophage was found to be situated on exactly the same part of the chromosome as in the original lysogenic strain. The progeny of crosses between F^+ strains susceptible to lysogeny by phage λ and F^- nonlysogenic strains possess, without exception, the lysogenic properties of the F^- parent. It is postulated that those recombinants that inherit the chromosome segment on which the prophage is situated are nonviable.

1610 Okabe, N. & Goto, M.
(**Studies on *Pseudomonas solanacearum*. I. On classification of the strains by means of bacteriophages and on the virulence of the strains**).
Shizuoka Daigaku Nogakubu Kenkyu Hokoku/Rep. Fac. Agric. Shizuoka Univ. 1953 : No. 3 : 52–80. [Japanese].

By means of the phage-lysis technique, at least 40 strains of *Ps. solanacearum*, collected from a range of Japanese crop plants, have been distinguished; 13 differential phage strains were employed.

1611 Okabe, N. & Goto, M.
(**Studies on *Pseudomonas solanacearum*. II. On the kinds of bacteriophage and their characteristics**).
Shizuoka Daigaku Nogakubu Kenkyu Hokoku/Rep. Fac. Agric. Shizuoka Univ. 1953 : No. 3 : 81–100. [Japanese].

Eight bacteriophage strains active against *Ps. solanacearum* are described. They fall into six immunological groups. Data are provided on the plaque size, host range, thermal inactivation point, stability in salt solution, pH tolerance range, latent period and burst size of each strain.

1612 Okabe, N. & Goto, M.
(**Studies on *Pseudomonas solanacearum*. III. On virus-resistant forms**).
Shizuoka Daigaku Nogakubu Kenkyu Hokoku/Rep. Fac. Agric. Shizuoka Univ. 1953 : No. 3 : 101–27. [Japanese].

The development of virus-resistant bacteria in susceptible bacterial cultures is reported. The presence of the phage accelerates the growth of the resistant deviants but does not appear to be necessary or responsible for their origin. Virus-resistant bacteria have not been detected in host plants parasitized by *Ps. solanacearum*.

1613 Pontecorvo, G. & Kafer, E.
Maps of a chromosome region in *Aspergillus nidulans* based on mitotic and meiotic crossing over.
Heredity 1954 : **8** : p. 433. (Abst.).

A map for the *bi* chromosome has been constructed on the basis of data on mitotic recombination; the gene order detected has been found to agree with that obtained by mapping by means of tetrad analysis. The relative distances for three regions (centromere—*pro* 1—*paba* 1—*y*) have been calculated.

1614 Pritchard, R. H.
The relationship between a group of alleles in the "ad" region of *Aspergillus nidulans*.
Heredity 1954 : **8** : p. 433. (Abst.).

Crosses involving allelic mutants requiring adenine for growth have yielded adenine-independent types. These apparent back-mutants are interpreted as multiple cross-overs within a very short chromosome segment. One pair of alleles already tested shows a position effect (*adx ady*/ + + → normal; *adx* +/+ *ady* → mutant).

1615 Pontecorvo, G.
Alleles or pseudo-alleles?
Heredity 1954 : **8** : p. 434. (Abst.).

In studies of *Aspergillus* and *Drosophila* at the Department of Genetics, University of Glasgow, mutant alleles from the same allelomorphic series have all exhibited crossing-over *inter se.* A position effect has also been detected in three of the five groups studied in the above two organisms. In *Aspergillus* the characters affected are requirements for biotin, adenine, paraaminobenzoic acid and proline. It is suggested that allelism and pseudoallelism are one and the same phenomenon.

1616 Woodward, V. W.
Genetic and physiologic differences in *Neurospora* induced by different physical mutagens.
Radiation Res. 1954 : **1** : p. 567. (Abst.).

The filtration and selective plating technique for isolating biochemical mutants of *Neurospora* was used to obtain information on mutation rates and on the rate of germination after treatment with various mutagens. The mutation rate for one locus controlling ornithine utilization varied according to the kind of mutagen. After treatment with ultraviolet rays differences in the incidence of specific types of mutants were obtained, depending on whether the conidia were irradiated wet or dry. No correlation was found between physiological stimulation, as detected by data on rate of germination, and biochemical mutation.

1617 Williams, E. B.
The inheritance of pathogenicity and certain other characters in *Venturia inaequalis* (Cke.) Wint.
Diss. Abstr. 1954 : **14** : Publ. No. 9904 : p. 1897.

Investigations were carried out on the inheritance of the ability of (1) race 2 to attack *Malus baccata* 'Dolgo' and (2) certain segregates of the Russian introduction *M. pumila* R12740–7A and (3) race 3 to attack *M. pumila* var. *niedzwetzkyana* 'Geneva.' These three unusual forms of pathogenicity were each controlled by a single gene, designated dolgo (d^+), russian (r^+) and geneva (g^+) respectively. The gene sikkless′ (s') for reduced virulence on *M. sikkinensis* was situated 22·8 units, g^+ 31·3 and mt^+ (for mating type) 31·9 units from the centromere. The gene order s—25·0 units—d^+—9·7—r^+ was established. This mapping was uncorrected for double cross-overs. The factors g^+, sikkless′ (s′), *gr* for green mycelial colour and mt^+ were independently inherited. New recombinant strains involving d^+, r^+ and g^+ provided no evidence of interaction of these genes to give new types of infection.

1618 Winge, Ø. & Roberts, C.
On tetrad analyses apparently inconsistent with Mendelian law.
Heredity 1954 : **8** : 295–304.

Supernumerary mitoses within the ascus of yeast and the subsequent formation of binucleate spores are suggested as the causes of deviating Mendelian ratios obtained from asci of (1) $M_3m_3R_2r_2$ hybrids and (2) a hybrid produced by mating α *ma* and *a Ma* haploid cultures supplied by C. Lindegren. Cytological investigations have confirmed the occurrence of supernumerary mitoses and binucleate spores.

1619 Winge, Ø., & Roberts, C.
Causes of deviations from 2 : 2 segregations in the tetrads of monohybrid yeasts.
CR Lab. Carlsberg 1954 : **25** : 285–329.

Genetical and cytological evidence is presented which indicates that deviations from the 2 : 2 segregation observed in tetrads of singly heterozygous diploid yeast hybrids may be the result of extra mitoses within the ascus, giving some spores which do not survive and occasionally some which are binucleate and subsequently give rise to directly diploidized and sometimes heterozygous single-spore cultures. Such binucleate spores may also occur in hybrids between haploid yeasts of opposite mating type. When a 3 : 1 ratio occurs in a tetrad instead of the expected 2 : 2 ratio, one of the three dominant types is diploid and usually heterozygous. In a doubly heterozygous yeast hybrid, an ascus which produces two types of spores, e.g. 2*MR* : 2*mr*, is termed dicratic, and it is theoretically and experimentally demonstrated that when such an ascus yields an abnormal 3 : 1 segregation for one of the genes, then, if one of the three spore types showing the dominant character is heterozygous with respect to one gene, this type must also be heterozygous with respect to the other gene. It is noted that the tendency to undergo extra mitoses appears to be inherited. The theory of gene conversion is considered to provide an unsatisfactory explanation of the observed phenomena (cf. *PBA*, Vol. XXIII, Abst. 2429).

1620 Lindegren, C. C. & Lindegren, G.
Stability of hybrids of *Saccharomyces*.
Cytologia, Tokyo 1954 : **19** : 45–47.

The problem of obtaining true hybrids of *Saccharomyces* is discussed in relation to the behaviour of dicaryons and the technique of obtaining triploids by mass mating.

1621 Lindegren, C. C. & Townsend, G. F.
Methods for distinguishing the spindle, the centrochromatin and the chromosomes of the yeast cell.
Cytologia, Tokyo 1954 : **19** : 104–09.

The authors consider the structure which is characterized by rigidity, acidophilia, an invariable association with the nuclear vacuole and elongation during budding to be the spindle. Formerly they termed this structure the centrosome. Staining methods for the identification of the spindle, centrochromatin and other components of the yeast nucleus are described.

1622 Townsend, G. F., Sarachek, A. & Lindegren, C. C.
The effects of ultraviolet and X-radiation upon the centrochromatin of *Saccharomyces*.
Cytologia, Tokyo 1954 : **19** : 130–32.

At interphase the centrochromatin in the yeast cell is visible as a spherical body in contact with the nuclear vacuole and spindle; during prophase it becomes crescent shaped. With X irradiation of interphase cells, crescent formation was effected within the normal time, even at dosages causing inactivation, but with ultraviolet treatment crescent formation was delayed, This effect of ultraviolet light was not photoreversible. It is suggested that the effects of radiations upon the arrangement of the centrochromatin at prophase are not directly related to their effects upon DNA synthesis.

1623 Sarachek, A.
A comparative study of the retardation of budding and cellular inactivation by ultraviolet radiation in polyploid *Saccharomyces* with special reference to photoreactivation.
Cytologia, Tokyo 1954 : **19** : 77–85.

The curves for retardation of budding by ultraviolet treatment are exponential for *n* cells and sigmoid for 2*n*, 3*n* and 4*n* cells. When the curves are interpreted in terms of the multitarget hypothesis, a one-to-one correspondence can be shown between the number of chromosome sets and number of radiosensitive sites per cell. The rates of logarithmic inhibition of budding increase linearly with increasing chromosome number. The retardation of budding by ultraviolet radiation is photoreversible. After photoreactivation, however, the curves for retardation of budding of cells of the entire *n* to 4*n* series are exponential and independent of the number of chromosome sets. Photoreactivation does not therefore proceed in accordance with the dose-reduction principle that the effective ultraviolet dosage is reduced by a constant proportion per unit of visible light. Survival curves for all members of the series are sigmoid. The target values show a nonunitary increase with increasing chromosome number but the rates of logarithmic inactivation are independent of chromosome number. Inactivation rates are closely related to the slopes of the curves for inhibition of budding after photoreactivation. Photoreactivation of inactivated cells is in accordance with the dose-reduction principle. The same proportion of damage is repaired per unit of visible light in all cells of the polyploid series. The depression of budding activity by ultraviolet treatment reflects damage affecting both genetic and nongenetic cellular components; the nongenetic injury is closely related to the damage causing cell inactivation (cf. *PBA*, Vol. XXIV, Abst. 2710).

1624 Mortimer, R.
Studies on the effects of X-rays on yeast cells of different ploidy.
Radiation Res. 1954 : **1** : p. 225. (Abst.).

A marked reduction in spore viability was found in asci obtained from irradiated 2*n* cells; since the X-ray doses used were sublethal for the 2*n* cells, this result suggested that recessive lethal mutations had been induced. The X-ray sensitivity of 3*n* and 4*n* cells proved to be intermediate to that of *n* and 2*n* yeast; it was assumed that some dominant lethal mutations were present in the polyploid cells.

1625 Ogur, M.
Respiration in a polyploid series in *Saccharomyces*.
Arch. Biochem. 1954 : **53** : 484–90.

In experiments on *n*, 2*n*, 3*n* and 4*n* yeasts, oxygen uptake and carbon dioxide production both increased linearly with chromosome number when the strains were grown under comparable conditions and when the respiratory quotients were estimated on a cellular basis. Aerobic hybrids derived from crosses in which one of the parents was deficient with respect to aerobic respiration showed the full amount of respiration corresponding to the chromosomal complements, instead of the respiratory potential of the aerobic parent or an intermediate value between the parental values. It is postulated that the quantitative enzyme-potential is controlled by the quantitative genetic complement of the cell. Whether such control results from a gene-enzyme system or is the indirect outcome of nuclear control over cell size and size-related characteristics is not yet known.

1626 Majeed Ahmad, Rassaque Chaudhury, A. & Ahmad, K. U.
Studies on toddy yeast.
Mycologia 1954 : **46** : 708–20.

Of the 15 cultures isolated from toddy manufactured from the palmyra palm (*Borassus flabellifer*), 8 belonged to *Schizosaccharomyces pombe*, 6 to *Saccharomyces chevalieri* and 1 to *Saccharomycodes ludwigii*. The one strain of *S. pombe* analysed for its mating system proved to be homothallic; it was also found to be homozygous for the genes controlling synthesis of riboflavin, thiamin, biotin and pyridoxin. All 6 strains of *Saccharomyces chevalieri* fermented galactose in 48 hours; analysis of single-ascospore cultures from two of these strains, T_5 and T_7, showed that they were heterozygous for galactose fermentation and homozygous for nonfermentation of maltose and for raffinose fermentation; a case of mutation from the allele for nonfermentation of maltose to the allele for fermentation was recorded for T_7. All strains of this species were autotrophic for synthesis of vitamins of the B complex. T_5 and T_7 were homozygous for synthesis of riboflavin, thiamin, niacin and pyridoxin. Biotin synthesis in T_7 was controlled by a single locus for which the strain was heterozygous. T_5 and T_6 were homothallic, T_7 appeared to be basically heterothallic, with selfing superimposed, possibly either through mutation of the alleles for mating type or the presence of a gene responsible for self diploidization. The single strain of *Saccharomycodes ludwigii* failed to ferment raffinose.

1627 Taubina, D. Š. & Milakova, S. E.
(**A cold-resistant strain for the fermentation of fruit and berry juices**).
Vinodelie Vinogradarstvo SSSR (Winemak. & Vitic. USSR) 1955 : No. 1 : p. 12. [Russian].

The cider yeast 101 proved capable of fermenting apple, plum and cranberry juices at initial temperatures of 12–14° C and was tolerant of 5% alcohol.

1628 Laskowski, W.
Resistance of *Saccharomyces* to high concentrations of lithium chloride.
Science 1955 : **121** : 299–300.

Four nonallelic dominant genes, L_1, L_2, L_3 and L_4, conferring resistance to high concentrations of LiCl have been identified. The genes L_1 and L_2 were already present in two strains at the beginning of the experiment, whereas L_3 and L_4 arose after exposure to media containing LiCl. It is not yet known whether LiCl behaves as a mutagen or simply serves as a selective agent favouring mutants of spontaneous origin. The mutants and normal cells differed with respect to their requirement for a minimal amount of potassium.

1629 Weinfurtner, F. & Voerkelius, G. A.
Das Absterben von Hefen unter der Einwirkung von Noxen in Abhängigkeit von Ploidie-Grad. (**The mortality of yeast strains when subjected to injurious agents as dependent upon the degree of ploidy**).
Naturwissenschaften 1955 : **42** : p. 20.

At the Technical Institute of the University of Munich, Germany, a positive relationship was established between level of polyploidy and resistance to a series of injurious physical and chemical treatments.

1630 Rowell, J. B.
Segregation of sex factors in a diploid line of *Ustilago zeae* induced by alpha radiation.
Science 1955 : **121** : 304–06.

After exposing vegetative sporidia of the diploid line 410qq to α radiation, isolates were obtained which showed the same segregation and recombination for sex factors as isolates from chlamydospores (cf. Abst. 87).

The treatment evidently caused an unstable condition in the vegetative cells that led to segregation and recombination of the sex factors during multiplication of the affected cell.

1631 Copisarow, M.
Free chromosomes as viruses.
Naturwissenschaften 1955 : **42** : 101–02.

It is suggested that viruses arise in both plant and animal tissues from chromosomes liberated by cell fragmentation.

1632 Best, R. J.
Cross protection by strains of tomato spotted wilt virus and a new theory to explain it.
Aust. J. biol. Sci. 1954 : **7** : 415–24.

A full account is given of the work referred to in a previous paper (cf. *PBA*, Vol. XXIV, Abst. 2724), and additional evidence is presented in favour of the author's theory that the interference observed between different strains of virus when inoculated into plants simultaneously or at different times is caused by the exchange of symptom-causing determinants between the strains at some stage during their multiplication in infected cells.

CROP PLANTS

1633 Howard, H. W.
Crops and plant breeding.
J.R. agric. Soc. 1954 : **115** : 126–29.

Recent investigations on cereals, grasses, leguminous forage crops and potatoes in Britain are surveyed. Among the topics discussed are the following: the performance of varieties of wheat, oats and barley and changes in the lists of recommended varieties issued by the National Institute of Agricultural Botany; investigations on interspecific hybridization in *Lolium* (cf. *PBA*, Vol. XXIV, Abst. 3040); classification of lucerne strains (cf. *PBA*, Vol.XXIV, Abst. 2094); the genetic structure of wild populations of white clover with respect to cyanogenetic glucosides and linamarase (cf. *PBA*, Vol. XXIV, Abst. 3082); and resistance to *Phytophthora infestans*, common scab and root eelworm in the potato.

1634 **Committee for Colonial Agricultural, Animal Health and Forestry Research, Ninth Annual Report.**
Colonial Research 1953–1954. HM Stationery Office, London, 149–93.

The report includes brief accounts of the chief projects being carried out on crop selection and breeding in the different countries served by the Colonial Research Council of the British Commonwealth. Most of the work in progress has already been referred to in *Plant Breeding Abstracts.*

1635 **The Edinburgh and East of Scotland College of Agriculture.**
Trans. Highl. agric. Soc. Scot. 1953 : **65** : 109–17.

Varietal trials of herbage grasses and work on the susceptibility of potato varieties to dry rot are being continued.

1636 **The North of Scotland College of Agriculture.**
Trans. Highl. agric. Soc. Scot. 1953 : **65** : 117–28.

Besides varietal trials of oats, barley and grasses, selection of cabbage for resistance to club-root is in progress.

1637 **Report of the Agricultural Department, University College, Dublin, for the year 1953-54** : Pp. 19.

Wheat. Glasnevin Rosa has been crossed with suitable varieties to remedy its defects of insufficient winter hardiness and tendency to shatter; two derivatives of Glasnevin Rosa x Kärn [Kernel] have proved suitable for both winter and spring sowing and are to be multiplied for distribution.

Oats. The new short-strawed lodging-resistant oat Bonstar has lodged less than Glasnevin Triumph and equalled it in yield. The Canadian leaf-rust resistant varieties Rodney and Lanark are among the introductions likely to prove useful in breeding.

Barley. Lodging-resistant selections from crosses of Spratt Archer 37 No. 3 with Scandinavian varieties are being tested in field plots.

Grasses. Two polycross strains, one of cocksfoot and the other of perennial ryegrass, are being developed.

Red clover. The Glasnevin strain, a late-flowering Montgomery type, appears to be highly resistant to disease and is to be propagated for distribution.

Potato. Seedlings from Ulster Prince x Golden Wonder were included in the variety trials.

Brussels sprouts. Selection and breeding continued.

Tomato. Progress is being made in breeding for resistance to *Cladosporium.*

1638 **Report of the Second Crop Conference held at the Cambridge Union Society on 15th and 16th December, 1953.**
J. nat. Inst. agric. Bot. 1954 : **7** : 171–232.

The papers here reported have already been summarized in *PBA*, Vol. XXIV, Abst. 962.

1639 Thompson, E. G.
N.I.A.B. variety trials.
NAAS quart. Rev. 1955 : No. 27 : 89–95.

The following successive stages of the varietal testing procedure adopted by the National Institute of Agricultural Botany are described and discussed: (1) small-scale replicated field trials; (2) full-scale primary trials; and (3) full-scale secondary trials conducted with the cooperation of the National Agricultural Advisory Service.

Bericht über die Arbeitstagung 1954 der "Arbeitsgemeinschaft der Saatzuchtleiter" im Rahmen der "Vereinigung österreichischer Saatgutzüchter." (**Report on the 1954 meeting of the working party of the principal seed producers within the framework of the Association of Austrian Seed Producers**).
Admont 1954 : Pp. 372. (Mimeographed).

The following articles of interest to plant breeders are contained in this report of the above meeting, held in Admont on 20–22 January 1954.

1640 *Lein, A. Der praktische Weg zur Schaffung neuer Weizensorten. (The practical way of breeding new wheat varieties). (pp. 7–23).*

A survey of factors to be considered in breeding for increased yield in wheat is presented, special emphasis being placed upon the statistical evaluation of data obtained from variety trials.

1641 *Lechner, L. Erfolge und Probleme internationaler Getreidezüchtung.* (*International successes and problems in cereal breeding*). (*pp. 24–56*).

This summary of progress achieved in the development of new cereal varieties in Europe and America during the past few decades includes observations on breeding objectives in each country and on the particular problems confronting the breeder in different parts of the two continents. Mention is made of the effect of increased mechanization upon breeding aims. The comparative merits of hybridization, the induction of mutations and the creation of tetraploid varieties by means of colchicine are discussed briefly.

1642 *Fuchs, H. Qualität als Zuchtziel bei den vier Hauptgetreidearten.* (*Quality as a breeding objective in the four principal cereal species*). (*pp. 57–80*).

Breeding for improved quality in wheat, oats, rye and barley is discussed and methods by which quality may be assessed by laboratory tests are outlined.

1643 *Lasser, E. Aktuelle Fragen der Resistenzzüchtung gegen Getreidekrankheiten und Schädlinge.* (*Current questions in breeding for resistance to cereal diseases and pests*). (*pp. 81–95*).

A comprehensive account of research at present being carried out in Austria on breeding for resistance to diseases and insect pests attacking wheat, oats, rye and barley is given. Mention is made of the principal diseases to which each of these four cereals is subject and resistant varieties are listed.

1644 *Hänsel, H. Winterfestigkeit und die Methoden ihrer Überprüfung bei Getreide.* (*Winter hardiness and methods of testing for it in cereals*). (*pp. 96–136*).

Difficulties involved in testing and breeding for winter hardiness in cereals are discussed with reference to combining hardiness with other desirable agronomic qualities such as early maturity, productivity, resistance to lodging and grain quality. Encouraging results have been obtained in Austria and neighbouring countries by crossing pedigree varieties with winter-hardy land races. Recent research in Austria and elsewhere on the genetical basis of winter hardiness in wheat, rye and barley is outlined and suitable methods of testing for hardiness both in the field and under laboratory conditions are mentioned.

1645 *Adam, J. Der Weg zur Züchtung einer neuen Roggensorte.* (*The way to the breeding of a new variety of rye*). (*pp. 137–57*).

The basic principles involved in the breeding of new varieties of rye are discussed in connexion with recent work at the Harrach Plant Breeding Station, Gerhaus. The main aim of the rye breeding programme in Austria is the development of a high-yielding, early-maturing, short-strawed variety possessing adequate resistance to cold, lodging and diseases. At Gerhaus, Petkus Kurz [Petkus Short] has been crossed with Petronell Tyrnauer winter rye to combine the high yield and lodging resistance of the former with the hardiness and reliability of the latter variety; the F_1 of this cross is at present under observation. The comparative merits of mass and pedigree selection are discussed with particular reference to problems involved in the improvement of a cross-pollinated species such as rye, in which the potential yield cannot be assessed until after the plant has been pollinated.

1646 *Wunderlich, G. Ergebnisse experimenteller Untersuchungen über den Ausfall des Getreides.* (*Results of experimental investigations on shedding in cereals*). (*pp. 158–77*).

Environmental and physiological factors influencing the extent of shedding in cereals before and during harvesting are discussed and data on varietal differences in susceptibility to both shedding and shattering are presented.

1647 *Wenzl, H. Neuere Ergebnisse der Virusforschung und ihre Bedeutung für den österreichischen Pflanzenzüchter.* (*Recent results of virus research and their importance to the Austrian plant breeder*). (*pp. 178–202*).

Ways by which the presence of virus diseases in potato and beet may be detected are described and progress achieved in developing resistant varieties is outlined. Special mention is made of the use of wild species of *Solanum* in crosses with cultivated varieties and of recent work in Europe and North America in breeding beet varieties resistant to yellows.

1648 *Pammer, F. Zuchtbuch und Sortenliste.* (*Pedigree book and variety list*). (*pp. 203–09*).

The implications of the federal law of 15 December 1953, which provides for the introduction of an Austrian list of approved varieties and for the protection of breeders' rights, are discussed. The writer is in favour of a system of varietal testing and registration based upon the procedure followed in the Netherlands and advocates the institution of a varietal register and a list of approved varieties. The varietal register would serve to protect breeders' rights, while the list of approved varieties would assist practical horticulturists and agriculturists.

1649 *Graf, A. Erfolge und Methoden der Zuckerrübenzüchtung. Die weltwirtschaftliche Bedeutung der Zuckererzeugung aus Rüben.* (*Successes and methods of sugar-beet breeding. The importance to world economy of producing sugar from beets*). (*pp. 210–28*).
The development of the industry since Achard's first attempts to extract sugar from beet in 1802 is outlined, emphasis being placed upon the increasingly competitive position of sugar beet resulting from the development of new varieties. The development of polyploid strains, the utilization of hybrid vigour, results achieved by mass and pedigree selection and the use of *Beta vulgaris*, *B. maritima* and *B. trigyna* in hybridization work in Europe and North America are among the subjects treated. Present aims are described as including the development of varieties with reduced nitrogen and ash contents, and thus more suitable for industrial extraction, and breeding for resistance to *Cercospora*, nematodes and virus and fungous diseases. Good keeping quality and suitability to mechanical harvesting are also important.

1650 *Kopetz, M. Forderungen des Pflanzenbaues an die Pflanzenzüchtung.* (*The demands of agriculture on plant breeding*). (*pp. 229–38*).
A brief summary of breeding objectives in Austria is presented, with special reference to cereals. In addition to breeding for increased yield and reliability of yield, attention needs to be paid to technical requirements such as improved threshability and resistance to lodging and shedding. In vegetables, an improvement in the taste of the product is of primary importance.

1651 *Pammer, F. Methodik der Sortenprüfung bei Futterleguminosen, Klee- u. Grasarten.* (*Procedure in testing varieties of forage legumes and clover and grass species*). (*pp. 239–51*).
Various factors to be considered in assessing the value of new strains of forage plants are discussed. The ability of a variety to compete with other species in mixed sowings, its nutritive value as determined by chemical tests and its resistance to drought are of primary importance. In trials, care should be taken to avoid errors in calculating dry-matter content due to temporary fluctuations in the moisture content of the plant resulting from chance changes in the moisture conditions of the soil or atmosphere.

1652 *Buchinger, A. Die Bedeutung des Hybridmais in Europa.* (*The importance of hybrid maize in Europe*). (*pp. 252–59*).
The development of hybrid maize in the USA, its introduction into Europe under the auspices of the FAO and the performance of North American hybrids under European conditions are discussed. The necessity of breeding hybrid varieties more adapted to Austrian conditions is urged.

1653 *Mayerl, F. Der Stand der Hybridmaiszüchtung in Kornberg.* (*The state of hybrid maize breeding in Kornberg*). (*pp. 260–89*).
The Seed Producing and Experiment Station, Kornberg, Steiermark, has been experimenting since 1946 with the production of inbred lines suitable for the development of hybrid varieties adapted to local conditions. Breeding aims include the development of hybrids giving a high yield of good quality grain, resistant to lodging and fungous diseases and with early maturity. A number of promising inbred lines and top crosses have been obtained, for the most part from local land races. The ultimate aim is to make Austria independent of imports of foreign hybrid seed. In trials of American hybrids in 1953, Wisconsin 416 gave the highest yields of grain, while Wisconsin 641AA, U32 and Iowa 3416 proved the most productive for silage purposes.

1654 *Hanisch, H. Übersicht über die Gemüse- und Blumenzüchtung Österreichs.* (*Review of vegetable and flower breeding in Austria*). (*pp. 290–323*).
The breeding of varieties of horticultural crops in Austria is reviewed. At the Haubensak Seed Production Co., Brunn, emphasis is being placed upon the production of new varieties of peas, beans, onion, radish, cabbage, cucumber, tomato, carrot, beetroot and parsley and results obtained with these crops are reviewed briefly. An account of the performance of recently introduced foreign varieties, mainly from Germany, is given; a number of these have given unsatisfactory results under Austrian conditions. The techniques employed in developing a new variety, either by mass or pedigree selection or by

hybridization, are described in detail and the importance of maintaining the purity of a new selection or variety once it has passed from the breeder to the seed producer is stressed.

1655 *Steineck, O. Ziele und Wege der Kartoffelzüchtung. (Objectives and methods of potato breeding). (pp. 324–38).*

Research on the influence of photoperiod on tuber production is reviewed. The principal aims of potato breeding programmes are the elimination of short-day types and the development of strains with a neutral photoperiod. The literature on the selection of neutral-day plants and techniques to be employed is reviewed.

1656 *Demel, J. Sortenprüfung bei Kartoffeln. (Testing potato varieties). (pp. 339–45).*

A brief account of methods employed in Austria, Germany and the Netherlands in conducting potato variety trials is given. At the Grabenegg Experiment Station, Austria, importance is attached to testing for resistance to virus and other diseases, in addition to yield trials. The point is made that, as the district from which the potatoes are obtained may influence the results of variety trials, all varieties undergoing test should, as far as possible, be obtained from the same geographical area. The desirability of spreading variety trials over a number of years and the need for ensuring that varietal comparisons are made between varieties of the same maturity group are also mentioned.

1657 *Haberl, H. Ölpflanzenbau- und Züchtung in Schweden und Deutschland. (The cultivation and breeding of oil plants in Sweden and Germany). (pp. 346–66).*

The author gives his impressions of a study tour of research stations in Sweden and Germany concerned with the breeding of rape, white mustard and flax and compares progress achieved in these countries with present conditions in Austria. Information on increases in yield achieved over the past few decades by the introduction of new high-yielding varieties is given and recommendations are made as to the further development of the industry in Austria.

1658 *Frimmel, G. Ein Blick auf die Entwicklung der Kleezüchtung in Schweden und auf die Verwendung des Polycross-Verfahrens in der Futterpflanzenzüchtung. (A glance at the development of clover breeding in Sweden and the use of the polycross method in breeding forage plants). (pp. 367–72).*

A history of the breeding of clover varieties in Sweden from the development of the first Svalöf and Weibullsholm pedigree strains in the second decade of this century is given and information provided on the more important varieties at present under cultivation. The polycross technique, as employed at the Swedish Seed Producing Station, Lännäs, is described with reference to its value in determining the comparative combining ability of clones of clover and timothy.

1659 Vorläufige Mitteilung von Teilversuchsergebnissen der Bundesanstalt für alpine Landwirtschaft Admont (Austria). Berichtsjahr 1953/54. [**Preliminary communication on the results of regional trials conducted by the Federal Institute of Alpine Agriculture, Admont (Austria). Report for the 1953-54 season**].
Admont 1954 : No. 26 : Pp. 117. (Mimeographed).

The above report presents extensive data in tabular form, on the results of variety trials of the following crops: wheat, oats, rye, maize, barley, *Arrhenatherum elatius*, *Trisetum flavescens*, perennial ryegrass, Italian ryegrass, meadow fescue, red fescue, cocksfoot, timothy, red clover, lucerne, potato, mangel, sugar beet, turnip, swede, cabbage, cauliflower, kohl rabi, lettuce, carrots, beetroot, radish, peas, beans and oil plants.

1660 SEDLMAÏR [SEDLMAYR], K.
(**Plant breeding in Hungary**).
Priroda (Nature), Leningrad 1954 : No. 11 : 89–93. [Russian].

Cereals. Varieties developed in recent years include early-maturing hybrid wheats resistant to drought, shedding and rust, a winter barley producing a high yield when sown with non-vernalized seed and a hybrid maize that outyields all other hybrids and varieties recently tested in Hungary and Austria.

Beet. The resistance of *Beta maritima* to *Cercospora* has been transferred to sugar beet. Hybrid Beta K91 is outstanding among the new forms for its high yields of root and sugar. In recent Austrian and Hungarian trials the new mangel variety Beta Rozovaja [Pink Beta] has persistently outclassed other productive varieties.

Linum. A dual-purpose variety, notable for the high quality of its oil, and a drought-resistant, large-seeded linseed have been developed. The 1000 seed weight of the latter is up to 13g.

1661 LAROSE, É.
Quelques points d'actualité en matière de génétique générale et d'amélioration des plantes. (**Some points of topical interest concerning fundamental genetics and plant breeding**).
Ann. Gembl. 1955 : **61** : 15–28.

This popular account of the genetical basis of plant breeding gives a survey of various theories on the nature and chemical composition of the gene, the role of the gene in transmitting hereditary characters, the induction of mutations and polyploidy by physical and chemical agents, cytoplasmic inheritance, hybridization technique and the exploitation of heterosis. Mention is also made of the value of genes for male sterility in the production of commercial hybrids.

Berättelse över Nordiska Jordbruksforskares Förenings Nionde Kongress, Köpenhamn, 1953. (**Report of the Ninth Congress of the Association of Scandinavian Agricultural Research Workers, Copenhagen, 1953**).
Nord. JordbrForskn. 1954 : **36** : 1–628.

1662 *Andersson, G. Oljeväxtodling i Sverige. (Cultivation of oil plants in Sweden). (pp. 129–32).*

Breeding for winter hardiness in overwintering species and for high oil content, straw strength and resistance to shedding, pests and diseases of both winter and spring species is in progress. Some promising recently developed varieties of rape, turnip rape, white mustard and linseed are mentioned. Further work includes: the synthesis of new forms of rape by crossing cabbage and turnip rape; investigations into the nature of winter hardiness; and the improvement of spring rapes by crossing with winter rape.

1663 *Tedin, O. Stambegreppet hos korsbefruktare. (The strain concept in cross-pollinating plants). (pp. 164–66).*

The author considers that, in view of the variety of methods whereby strains and varieties are developed in different species, no exact definition of a strain or fast rules for naming new forms can be laid down. It is urged that the award of varietal rank should depend on economic merits rather than on purely morphological characters.

1664 *Frandsen, H. N. Formering af fremmedbefrugtere. (Multiplication of cross-pollinating plants). (pp. 167–73).*

Problems of maintaining and multiplying élite and stock seed of strains which tend to change or deteriorate as a result of genetic instability, open pollination or natural selection are discussed.

1665 *Nissen, Ö. [Ø.]. Stammeprövningen. (Varietal testing). (pp. 174–76).*

Varietal testing procedure is outlined and the advantages of using commercial rather than élite seed in testing cross-pollinated crops are stressed.

1666 *Jacobsen, B. Aktuelle problemer vedrörende formering, vedligeholdelse og kontrol af kartoffelsorter. (Topical problems concerning multiplication, maintenance and control of potato varieties). (pp. 177–81).*

The block selection method employed in Denmark for multiplying and maintaining variable material is outlined; it is noted that early and mid-early varieties show a greater tendency to mutate than late varieties.

1667 *Nielsen, E. L. Metoder anvendt ved forædling, afprövning og vedligeholdelse af stammer af foderplanter i USA. (Methods applied in breeding, testing and maintenance of varieties of forage plants in the USA). (pp. 182–86).*

In the course of this brief survey of American work on cytogenetics and breeding for seed quality, nutritive value and resistance to diseases, with particular reference to grasses, it is noted that there appears to be a positive correlation between self and cross fertility in *Bromus inermis* and that plant height was greater in crosses between plants from open-pollinated parents than in those from self-pollinated parents. Seed size was found to be an inherited character highly correlated with rapidity of germination.

An account of the organization of regional varietal trials in the USA is included.

1668 *Persson, A. R. Fellesnordiske målestokksorter og fellesregler for karaktergivingen i grönsakforsökene. (Joint Scandinavian standard varieties and joint rules for scoring in vegetable trials). (pp. 197–99).*

A ten-year Norwegian plan for conducting comparative trials of Norwegian and other Scandinavian vegetables is described.

1669 *Tometorp, G. Gemensamma mätare och enhetliga bedömningsnormer i försök med köksväxter. (Joint controls and uniform assessment standards in trials of vegetables). (pp. 200–05).*

Recommendations for the use of common control varieties in Scandinavian countries are made.

Problems encountered in using a ten-grade scale for the assessment of qualitative characters are discussed in detail.

1670 *Hansen, L. Karaktergivning i grönsagsforsögene. (Scoring in vegetable trials). (pp. 206–08).*

A cooperative scheme for testing vegetable varieties in Scandinavian countries is advocated, the need for a common scoring technique for assessing quality being stressed.

1671 *Mac Key, J. Svartrostbekämpning via växtförädling. (Black rust control through plant breeding). (pp. 227–29).*

Wheat breeding in the USA and Canada for resistance to black rust races is briefly reviewed.

1672 *Lihnell, D. Något om förekomsten av hallonviroser i Sverige. (On the occurrence of raspberry viruses in Sweden). (pp. 301–04).*

In 45 trials involving four varieties, only Asker showed no visible sign of any virus infection.

1673 EIKELAND, H. J.
Nokre av dei nyaste sortane i korn- og rotvekstavlen. Serleg kornsortar. (**Some of the newest varieties in cereal and root crop breeding. Especially cereal varieties**).
Bondevennen 1955 : **58** : 66–69.

The merits of the oat varieties Blenda, Sol II [Sun II], Guldregn [Golden Rain] and Bambu, of the two-rowed barley Domen and the six-rowed barley Varde, of the spring wheat Norrøna [Norse] and of the mangel Barres Pajbjerg Ideal are compared with those of older varieties.

1674 ANDERSSON G.
Sveriges Utsädesförenings årsmöte i Sollefteå den 27 och 28 juli 1954. (**The Swedish Seed Association's meeting at Sollefteå, 27 and 28 July 1954**).
Sverig. Utsädesfören. Tidskr. 1954 : **64** : 343–58.

The substance of several addresses read at the above meeting has already been recorded in papers by Å. Åkerman (cf. Abst. 768) and K. Wicklund (cf. Abst. 770).

1675 BUNDGAARD, C. M.
Beretning om landboforeningernes virksomhed for planteavlen på Sjælland. (**Report on the work of the agricultural associations for plant cultivation in Sjælland**).
København 1955 : Pp. 237.

Details of field experiments carried out by 26 local agricultural associations and the combined results for the whole of Sjælland are reported. The crops tested include wheat, oats, rye, maize, barley, lucerne, white clover, beet and potato.

1676 DAM KOFOED, A.
54.beretning om planteavlsarbejdet i landboforeningerne i Jylland. (**54th report on the plant cultivation work of the agricultural associations of Jutland**).
1954 (1955) : Pp. 703.

Details are given of the local field experiments and varietal trials carried out by 103 agricultural associations in different parts of Jutland. The crops tested include wheat, oats, rye, barley, herbage plants and root crops.

1677 KOOPMAN, C.
De plantenveredeling in deze tijd. (**Plant breeding today**).
Jaarb. algem. Bond Oud-leerl. Inricht. Middelbaar LandbOnderwijs., Wageningen 1953–54 (1954) : 49–74.

The author surveys the progress achieved in the Netherlands during the last three decades in breeding improved varieties of cereals, root crops, vegetables, forage grasses, leguminous forage plants and fibre flax and indicates current breeding aims in respect of these crops.

1678 DORST, J. C.
Some remarks on the breeding of field crops in the Netherlands.
Euphytica, Wageningen 1954 : **3** : 212–20.

The organization of breeding of field crops in the Netherlands is described. New varieties are bred almost entirely by private breeders, to whom advice and material are given by government institutes, the Institute of Agricultural Plant Breeding and the Foundation for Agricultural Plant Breeding, at Wageningen. The value of the Descriptive List of Agricultural Crop Plants to farmers, breeders and seed producers is discussed (cf. p. 104 above).

1679 Rapport d'activité 1953. Stations fédérales d'essais agricoles, Lausanne. (**Report for 1953 on the work of the Federal Agricultural Experiment Stations, Lausanne**).
Landw. Jb. Schweiz. 1954 : 785–1047.

In addition to information on the crops listed below, the results of variety trials of forage crops, tobacco and tomato are given.

Wheat. A large number of crosses have been effected between American and European varieties with a view to combining the disease resistance and good baking quality of the former with the high yields of the latter. In addition, Probus and the Mont Calme lines 245 and 268 have been crossed with a wide range of North American spring wheats resistant to dwarf smut. Line 268/93 (Probus x Newthatch) has been crossed with Cappelle, Heine VII, Carsten VIII and Derenburger Silber [Derenburg Silver] to obtain hybrids giving higher yields than the parent varieties. In variety trials, the winter wheats Taca and Cappelle and the spring wheat Lichti proved the most productive. Cappelle was also highly resistant to lodging. The F_1 and F_2 of crosses between Probus and MC245 on the one hand and *Triticum timopheevi*, *T. dicoccum*, *T. durum*, *T. turgidum* and *T. persicum* on the other are under observation. The F_2 of the cross involving *T. timopheevi* comprises 47 plants, the majority of which are highly sterile. The results of crosses between wheat and rye and wheat and *Aegilops* are also given.

Oats. In variety trials of winter oats, Noire du Prieuré [Priory Black] and Picton gave the highest yields and were also the most winter hardy. Pajbjerg Regent, Pajbjerg Rex, Flämingstreue and Marne gave the highest yields among the spring oats, while Wodan, Palu and Sisu were the most resistant to lodging.

Rye. The F_1 and F_2 of tetraploid forms of Witzwil, Rothenbrunnen and Berna obtained by colchicine treatment are under observation. Many of the plants are highly sterile and selection to improve fertility is being carried out. In variety trials, Petkus gave the highest yields and was highly resistant to lodging.

Maize. Inbred lines have been raised with a view to obtaining hybrid varieties adapted to Swiss conditions.

Barley. In trials of winter varieties, Firbeck I, Engelen II and Engelen 264/757 were distinguished by their high yields and resistance to mildew. Of the spring barleys tested, Weibull 4468 and Breuns Wisa were the most productive; Herta proved highly resistant to lodging.

Potato. Bintje and Erdgold gave the highest yields in variety trials; Robusta gave the highest yields of starch and dry matter.

1680 **[A general report on agricultural progress (breeding)].**
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 103–28. [Japanese].

A general survey, accompanied by extensive bibliographies, is given of Japanese plant and animal breeding work during 1941–50. The topics reviewed include new varieties, breeding principles, genetics and technique, including the induction of polyploidy.

Proceedings of the Thirty-Ninth Indian Science Congress, Calcutta, 1952.

Part II. Presidential addresses.

1681 *Ramanujam, S. Cytology in India with special reference to crop plants.* (*pp. 127–47*).

A comprehensive survey is presented of cytological research carried out on cereals, fibre plants, sugar cane, oil crops, pulses, fruits and vegetables in connexion with breeding in India.

Part III. Abstracts.

1682 *Murty, V. N. On a new approach to the analysis of lattice designs.* (*p. 15*).

A method of deriving intrablock variety effects from interblock estimates in the analysis of lattice designs is outlined.

1683 *Chakravorti, A. K. Cytogenetical studies in* Zingiberaceae. (*pp. 30–31*).

The following are among the chromosome numbers reported: *Zingiber cassumunar*, *Z. officinale*, *Z. zerumbet* and *Z. rubens*, $2n = 22$; *Elettaria cardamomum*, $2n = 52$; *Curcuma amada*, *C. aromatica* and *C. angustifolia*, $2n = 42$; and *C. longa* and *C. zedoaria*, $2n = 63$. An unusually large number of constrictions characterized the chromosomes of all the genera studied, with the exception of *Curcuma*. It is suggested that the genera with higher chromosomes originated from ones with lower numbers by fragmentation at regions of secondary constriction.

1684 *Sen, N. Isochromosomes in tomato.* (*p. 31*).

A detailed report of these investigations has already been summarized (cf. *PBA*, Vol. XXIII, Abst. 747).

1685 *Das Gupta, C., Baruah, S. & Nandi, P. Selection of better strains of* Aspergillus niger *for the production of citric acid from sugars.* (*p. 34*).

Nine strains with improved citric-acid production were selected for further study.

1686 *Govindaswamy, S. "Cytological studies of a sterile diploid* Eumusa" 1 *Safet-velchi.* (*pp. 40–41*).

The complete or partial failure of pairing observed during meiosis in Safet-velchi ($2n = 22$) suggests that either this cultivated variety of Bombay is a hybrid between two distantly related $2n$ types or structural alterations of some of the chromosomes have occurred.

Part IV. Late abstracts.

1687 *Pushkarnath. Crossability studies in the South American diploid species of the tuber-bearing* Solanums. (*pp. 25–26*).

The results of selfing and of intraspecific and interspecific crossing of species belonging to the following series are summarized: *Cardiophylla, Pinnatisecta, Commersoniana, Acaulia, Demissa, Longipedicellata, Polyadenia* and *Tuberosa.* It is postulated that within a related group self and cross compatibility are controlled by the multiple alleles of one major gene. Evidence has been obtained of the occurrence of four independent and unrelated major genes which restrict the crossability between various groups of diploids.

1688 *Srinath, K. V. & Kundu, B. C. Cytological studies of pollen tube growth in reciprocal crosses between* Corchorus capsularis *and* Corchorus olitorius. (*p. 27*).

Another report of these investigations has been summarized in *PBA*, Vol. XXIV, Abst. 1281.

1689 *Chatterjee, D. & Nagbiswas, S. C. Observations on the floral biology of sweet potato.* (*pp. 27–28*).

Under conditions at the Indian Agricultural Research Institute, Delhi, the sweet potato was found to be self sterile (cf. *PBA*, Vol. XXIII, Abst. 2813).

Discussions.

1690 *Sections of geology, geography and botany.* (*pp. 118–31*).

Among the topics considered were (1) the geography of plants in relation to crop improvement in India and (2) the question of whether evolution is purposive.

Proceedings of the Fortieth Indian Science Congress, Lucknow, 1953 (1954).

Part II. Presidential addresses.

1691 *Parthasarathy, N. Genetics and crop improvement.* (*pp. 1–12*).

The role of methods of breeding based upon fundamental genetical research is discussed in relation to crop improvement in India.

Part III. Abstracts.

1692 *Padhi, B.* Alternaria*-like mutation of* Stemphylium. (*p. 72*).

A mutant of *S. botryosum* f. *lactucum* resembled *Alternaria* in its conidial growth and beaked spores.

1693 *Mahabale, T. S. & Chennaveeraiah, M. S. Studies on palms: Part IV. Cyto-analysis.* (*p. 102*).

The following chromosome numbers are reported: *Hyphaene indica* and *Caryota rumphiana*, $n = 18$; *Caryota mitis*, $n = 16$; and *Calamus rotang*, $n = 12$. It is suggested that the majority of palms can be divided into one series with $x = 8$ and another with $x = 6$.

1694 *Sen, K. Chemical mutagenesis in the tomato.* (*p. 107*).

A detailed account of these experiments on the mutagenic effects of nitrogen mustard and other vapours has already been summarized (cf. *PBA*, Vol. XXIII, Abst. 3078).

1695 *Nair, K. R. Design and analysis of triangular singly linked blocks.* (*p. 125*).

Triangular singly linked blocks form a subgroup of partially balanced incomplete block designs; the number of treatments is $\frac{1}{2}p(p-1)$. Three methods of constructing these designs are described and simplified formulae are presented for their analysis.

1696 *Murty, G. S. Trials with maize hybrids and varieties in India.* (*p. 134*).

Of the hybrids introduced from the USA and tested extensively in India, some with medium late or late maturity have produced significantly higher yields than the best local varieties. Very early-maturing hybrids have usually given poor results. The parental inbreds of the best double crosses are to be imported for seed production. Inbreds from various sources are also being tested for combining ability with the purpose of developing Indian double crosses.

1697 *Sunil Kumar Mukherjee. Cytology of some Malayan mangifera.* (*pp. 134–35*).

Cytogenetical investigations on *Mangifera foetida* and *M. caesia* are reported (cf. *PBA*, Vol. XXIV, Abst. 607).

1698 *Sampath, S. A study of tetraploidy in rice.* (*p. 135*).

Colchicine-induced tetraploids of homozygous and hybrid types are being studied at Coimbatore.

1699 *Prasad, B. G., Gupta, Y. P., Biswas, T. D. & Das, N. B. Studies on the nicotinic acid content of wheat.* (*p. 142*).

Significant differences in nicotinic acid content have been found among 14 varieties, chiefly of the NP series.

1700 *Gupta, Y. P. & Das, N. B. Studies on the riboflavin content of Indian wheat.* (*pp. 142–43*).

A study of 28 wheats, mostly of the NP series, revealed varietal differences in riboflavin content.

Part IV. Late abstracts.

1701 *Thakur, C. & Negi, N. S. Photoperiodic effect on sugarcane.* (*p. 16*).

The sugar canes Co.313, Co.419, B010, B011 and

B027 were subjected to continuous light for 3 months. This treatment generally caused a decrease in the total number of leaves as well as the total number of internodes. Initiation of flowering depended upon the production of a certain minimum number of leaves. The sucrose content of four varieties decreased as the result of the treatment. In all the aspects studied a differential varietal response to continuous light was observed.

Discussions.

1702 *Statistical methods in biological sciences.* (*pp. 37–42*).

C. R. Rao spoke of the need for biologists to state how far present statistical methods were adequate for their purposes. P. K. Bose reviewed the statistical methods available for classification and discrimination with special reference to the use of Studentized D^2 statistics. K. Kishen outlined the historical development of designs for field trials from R. A. Fisher's early work to the present time. S. S. Iyer described the statistical methods used by the Sugarcane Research Station, Shahjahanpur.

1703 *Soviet genetics.* (*pp. 68–70*).

P. Maheshwari defined the differences between the concepts of Soviet genetics and international or Mendelian genetics, criticizing the various claims of Russian investigators. O. J. Eigsti expressed the view that Soviet biology is not based on sound scientific methods. G. S. Puri, while accepting the gene theory, suggested that the effect of environmental factors upon the growth and development of the organism requires to be thoroughly investigated, so that the significance of the Soviet work can be better evaluated.

1704 **Scientific Reports of the Indian Agricultural Research Institute for the year ended 30th June 1952 and 1953** (1954) : Pp. 108 and 114.

Wheat. Breeding for resistance to rusts continued.

In hybrids of *Triticum vavilovi* with *T. vulgare*, *T. sphaerococcum* and *T. compactum*, all the main characteristics of the ear of *T. vavilovi*, with the exception of multinodal rachilla, showed dominance. Expression of the character of multinodal rachilla is apparently influenced by environmental conditions. Study of the F_3 of *T. vulgare* x *T. pyramidale* indicated that at least some of the specific characters of *T. vulgare* had been transferred to *T. pyramidale* in a number of segregates, presumably as the result of intergenomal pairing of the chromosomes. The amphidiploid *T. dicoccum* x *T. monococcum* has shown seedling susceptibility to leaf and yellow rusts and intermediate resistance to stem rust. It has been crossed with *T. vulgare* and *T. durum* for breeding purposes. Other hybrids under investigation include *T. timopheevi* x *T. durum* and *T. timopheevi* x *T. monococcum.* The caryotypes of *T. macha*, *T. monococcum* and other species have been studied.

Pot and field experiments on varietal reaction to drought continued. Factors affecting yield in different varieties were analysed on the basis of photosynthesis.

Maize. Inbreeding and tests of combining ability continued, with the object of producing hybrids from material of Indian origin. Of the American hybrids tested, NC27 and Dixie 33 have given an outstandingly good performance.

Sugar cane. Varietal response to red rot (*Colletotrichum falcatum*) and smut (*Ustilago scitaminea*) was studied.

Tobacco. The new selections S–19, S–22 and S-20 of *Nicotiana rustica* outyielded the control, NP18.

Oil crops. Investigations on the problem of improving seed fertility in colchicine-induced autotetraploids of *Brassica* crops, sesame and linseed continued. The attempt to increase the fertility of 4*n* toria by mass-pedigree selection of élite bulk populations has met with some success. Embryological abnormalities are a cause of sterility in 4*n* toria. Autopolyploids of different rust-resistant types of linseed varied in their expression of gigantism and seed sterility.

Progress is reported in the development of early maturing, rust-resistant strains of linseed.

Carthamus lanatus and *C. coerulens* have remained free from rust and *Cercospora.* Attempts to cross *C. lanatus* and *C. tinctorius* failed.

Radish. A number of intervarietal combinations have shown considerable hybrid vigour. The amount of hybrid seed obtainable from natural pollination is being determined.

Tomato. The F_1 of Sioux x Meeruti and Sioux x Prosperity displayed a high degree of hybrid vigour.

Hibiscus. *H.* (= *Abelmoschus*) *ficulneus*, *H. tuberculatus*, *H. pungens*, *H. manihot* and five indigenous varieties of *H. esculentus* are being used in breeding for mosaic resistance in okra. The chromosome number $2n = 58$ is reported for the new species *H. tuberculatus*.

Cajanus cajan. Wilt-resistant but, in most cases, late-maturing selections have been developed. Crosses are to be made with an early-maturing Brazilian strain to combine earliness and wilt resistance.

1705 **Annual Report of the Indian Council of Agricultural Research for 1952-53** (1954) : Pp. 189.

In addition to details of varietal trials of maize, millets, rice, various tuber crops, ginger, chilli, turmeric, banana and tomato and other vegetables, the following work is reported:—

Wheat. The results of extensive trials of native and introduced varieties for resistance to rust species are presented. Of 572 American wheats artificially inoculated in the adult stage with a mixture of races of black, brown and yellow rust, 82 showed resistance to all three species. Promising rust-resistant hybrids have been obtained at Delhi, Simla and Mahabaleshwar and in Madhya Pradesh.

Maize. Breeding is in progress at New Delhi, in the Punjab and in Uttar Pradesh. In the Punjab a high degree of homozygosity for factors governing tasselling period and ear circumference was found in the first and subsequent inbred generations. In a trial involving a number of single crosses it was observed that intravarietal hybrids were generally inferior in yield to intervarietal hybrids. The performance of inbred lines in top crosses was an indication of their performance in single crosses.

Millets. Promising selections of *Sorghum vulgare* showing resistance to *Striga* and several high-yielding *Pennisetum typhoides* hybrids with early maturity have been obtained in Madras. Some strains of *Panicum crus-galli* and *Paspalum scrobiculatum* superior in yield to local varieties have also been developed.

Rice. At Cuttack, 112 cross combinations involving 32 *indica* and six *japonica* parents have been effected. Co. 25 and 26, two high-yielding strains with resistance to *Piricularia oryzae*, have been released in Madras. In Kashmir, Chinese varieties have outyielded other introduced and native rices by 60% and have proved well adapted.

Sweet potato. The following chromosome numbers have been determined for 21 species of *Ipomoea*: *I. batatas*, $2n = 90$; *I. repens* and *I. uniflora*, $2n = 60$; the remaining 18 species, $2n = 30$.

Cardamom. Hybridization between Singampatti types was continued.

Pepper. Three wild forms from the Western Ghats were all monecious while cultivated varieties from Malabar and Travancore produced a preponderance either of hermaphrodite or of female flowers with few male flowers occurring in either case. The percentage of fruit set in cultivated varieties was directly proportional to the percentage of female flowers.

Fruits. Hybridization of mangoes from north and south India is being carried out. Ten grape varieties have shown resistance to powdery and downy mildew at Hyderabad. Breeding of guava and papaya is in progress.

Vegetables. Breeding and selection for habit, fruit characters and mosaic resistance in tomato and bhindi (*Hibiscus esculentus*) are being carried out.

Type 87 of Bengal gram (*Cicer arietinum*) has maintained its superiority over other varieties. Type 37 of red gram (*Cajanus cajan*), which has consistently given higher yields than local varieties in Madras, is to be released. Other high-yielding and early strains of these two species and of black gram (*Phaseolus mungo*), green gram (*Ph. aureus*), horse gram (*Dolichos biflorus*), moth bean (*Ph. aconitifolius*), lentil and pea are reported from various stations. Breeding for earliness in soya beans is in progress at Tarikhet.

1706 **Silver Jubilee Souvenir of the Indian Council of Agricultural Research, 1929-1954.**
New Delhi 1954 : Pp. 129.

This jubilee souvenir gives a popular account of the chief investigations carried out under the auspices of the Indian Council of Agricultural Research during the past 25 years. B. N. Uppal outlines the organization of agricultural research in India. The part devoted to crop production includes the following articles: Rice, by N. Parthasarathy; Wheat, barley and oats, by B. P. Pal; Millets, M. A. Sankara Iyer; Maize, S. M. Sikka; Pulses, T. R. Mehta; Oilseeds, C. R. Seshadri; Coconut, C. M. John; Potato, Pushkar Nath; Vegetables, B. P. Pal; Fruits, K. C. Kaik; Sugarcane, Nand Lall Dutt; Cotton, Kalidas Sawhney; Jute, B. C. Kundu; Fibre crops, S. W. Mensinkai and R. B. Deshpande; and Tobacco, B. S. Kadam. Most of these contributions include brief accounts of breeding and selection. Grasses and fodders by B. P. Pal, and Statistics in agriculture and animal husbandry by V. G. Panse are among the articles in a final section on miscellaneous subjects.

1707 Rapport du Conseil de l'Expérimentation et des Recherches Agronomiques pour 1953. (**Report of the Council of Agronomic Experimentation and Research for 1953**).
Alger 1954 : Pp. 366.

In addition to the crops mentioned below, varieties of oats, lucerne, lupin, vetch, forage grasses, French beans, peas and citrus fruits were tested for their suitability to Algerian conditions. The principal research stations at which these trials were held included Maison-Carrée, Sidi Bel Abbès, Ferme Blanche, Isserville, Sétif, Guelma and Bône Bou Hamra.

Wheat. The results of variety trials of hard and soft wheats, including introductions from Morocco, Tunisia, Libya and Italy, are summarized. At Maison-Carée, the hard wheat Hybride Palestinien 20606 [Palestinian Hybrid 20606] gave good results. The hybrid Oued Zenati x Bouteille [Bottle] was conspicuous for its earliness and proved moderately resistant to mealy endosperm; the quality of its grain was however inferior. A severe attack of mealy endosperm in 1953 showed all American varieties introduced into Algeria to be extremely susceptible to this disorder; Zenati 368 and Palestinien 21150 proved comparatively resistant. A hybridization programme is being carried out to obtain early-maturing varieties and varieties possessing resistance to mealy endosperm. Among the soft wheats tested, high yields were obtained from the crosses Pusa x Mentana and Pusa x Florence and from Pynite 2036 (Rharb x Florence). Foreign rust-resistant introductions under observation include Eureka, Gabo, Yalta, Kendee, Celebration, Fylgia and Thatcher.

Rye. Information on the yield, date of earing and period to maturity is presented for a number of varieties tested at various stations. Club Mariout 3290 gave outstandingly good results.

Barley. A number of crosses involving Colmar are under observation. Tichedrett 3133, Mireille and Alsace gave good results at Maison-Carrée and at various substations.

Maize. Attempts to develop hybrids suitable for Algerian conditions are being made. The results of trials of introduced and locally developed hybrids at a number of stations under irrigated and non-irrigated conditions are presented.

Sorghum. The American variety Piper was the only variety tested that displayed adequate resistance to red stripe.

Rice. The results of trials of introductions from Egypt, India, Portugal and Indochina are given. Rinaldo Bersani, Arroz Bomba and Balilla proved highly resistant to saline conditions. Americano 1600 yielded well but was susceptible to lodging.

Potato. The results of yield trials of varieties suitable for Algerian conditions are presented. Corona, Aquila, Robusta, Vale and Benedikta proved resistant to late blight.

Cotton. In the Bône district, Acala California gave the highest yields of introduced American varieties. Yield trials of local varieties on saline and nonsaline soils were conducted at several centres. At Hamadenas, Ashmouni, Giza 30 and Menoufi demonstrated their superiority.

Sugar beet. At Maison-Carrée, Pajberg Rex gave the highest yields of root and was the variety most resistant to bolting. Bataille [Battle], with a yield approximately 10% below that of Pajberg Rex, had a considerably higher sugar content.

Tobacco. At Isserville, a number of selected lines of Chebli, Colon and Djendel have produced yields higher than those of Spada, the usual standard variety. Of 200 varieties tested at Bône Bou Hamra, White Burley 41A, One Sucker Isserville, Souma 7, Maritima, Dragon vert 111–2 [Green Dragon 111–2] and Goundi 433 gave the highest yields.

Fig. The results of yield trials, data on morphological characters by which different varieties may be distinguished and the results of studies on the caprifig wasp are presented. Environmental factors influencing percentage of fruit set are outlined and information on the choice of varieties for different localities is given.

Almond. The results of trials of local varieties and of varieties introduced from France are reported, with special reference to percentage of fruit set and degree of self sterility. Cytological studies showed $n = 8$ in all the varieties tested. It is thought that floral abnormalities may affect the amount of fruit set in the different varieties, while a series of multiple alleles probably controls pollen-tube development in the style. Comprehensive agronomic data on the ten varieties considered the most suitable for Algeria are presented, together with information on their degree of self and cross fertility.

Olive. Information is presented on the floral biology of the olive in as far as it influences attempts at artificial pollination. Data on the degree of self and cross fertility of a number of varieties are given, together with the results of yield trials under different soil conditions.

Grape. French and Algerian vines were compared at a number of centres and the extent of their resistance to various diseases was noted. Clonal selection and hybridization are being carried out.

Tomato. Victor and Prospero are recommended for general cultivation in Algeria. The results of trials of varieties of European provenance at Maison-Carrée and Bône Bou Hamra, concerned primarily with discovering varieties suitable for the commercial extraction of the juice, are presented.

Lentil. The results of variety trials at Oued Berdi, Aïn Athman, Sétif and Sidi Bel Abbès are presented. At Sétif, Large verte Tiaret 164 [Broad Green Tiaret 164] has established its superiority over all other varieties.

1708 **Annual Report of the Department of Agriculture, Colony and Protectorate of Kenya 1952** (1954) : Pp. 180.

In addition to varietal trials of oats, barley, rice, sugar cane, cotton, bush fruits and vegetables, the following work is reported:—

Pyrethrum. Breeding for adaptation to high and low altitudes, flower yield and pyrethrin content was continued (cf. *PBA*, Vol. XXIV, Abst. 1729). The hybrids C45 (188 x 194), C48 (188 x P), C57 (194 x 486), C77 (468 x 486, C79 (468 x P) and Congo 1949 continued to show promise. Further crosses have been carried out.

Wheat. In addition to the work reported earlier (cf. *PBA*, Vol. XXIV, Abst. 148), 140 new crosses between local wheats and promising introductions have been made with the aim of obtaining material with resistance to the four stem rust races K9 to 12. Results of trials of promising introductions are described. Selection for straw quality and yellow rust resistance is being carried out in the two hybrids 384 (Equator II x Kenya Ploughman) and 385 (Equator II x 318AJ4AI) and in a number of other varieties and crosses. R64, a single plant selection from DC x Ceres, and the American variety Carleton CI12064 were released (cf. Abst. 1900).

Maize. The performance of introduced hybrids has proved unsatisfactory. Inbreeding of numerous lines and the production of hybrids adapted to local conditions were continued at three centres.

Cassava. Details are given of the reaction of a number of clones to mosaic and brown streak tested at Matuga and Gombato. Clone 4598/1 was uninfected by mosaic at either station, but other clones varied in reaction. Clones 4315/3, 4568/3 and C56 showed no brown streak.

Sunflower. This work is summarized in *PBA*, Vol. XXIV, Abst. 148.

Groundnut. Selection for resistance to *Fusarium* wilt is being carried out at Matuga.

1709 **Annual Report of the Department of Agriculture, Tanganyika for 1953. Part II. Experiments, Investigations and Reports of Specialists and Fishery Officers.** 1954 : Pp. 143.

Pyrethrum. Breeding according to the Hutchinson method has now reached the third of the six stages involved.

Maize. At the Ilonga Agricultural Experiment Station an attempt is being made to improve the variety Eckstein by Harland's method. Improvement of Katumbili by Brieger's technique is under way.

Sorghum. Early-maturing varieties are required with resistance to weevil, grain moth and grain moulds, resistance to *Striga* and smut, and, where bird attack is not serious, large grains. A useful combination of satisfactory yielding capacity and weevil resistance is expected in the F_4 of the first back cross of the weevil-susceptible variety BC27 x resistant Wiru to BC27. Other material being studied in breeding for weevil resistance includes back crosses of Dobbs x Wiru, BC27 x Msumbiji and BC27 x Belko. Msumbiji and Belko are apparently resistant to both weevil and grain mould. Use is also being made of Nokwe and Uskiriki in crossing; these varieties appear to be resistant to both weevil and grain moth.

In breeding for bird resistance, a combination of gooseneck (inverted head), awns and very large glumes is aimed at. Valuable early-maturing goosenecked selections have been obtained from BC27 x Ng'holongo, Oklahoma 44/14 (early American combine type) x Ng'holongo, BC27 x Korgi and Oklahoma 44/14 x Korgi and from the first back crosses of the two last-mentioned hybrids. Some selections from the Korgi crosses also have well-developed awns. Feki Mustaki, a variety with large grains and very large glumes but susceptible to bird attack because the grain projects from the sides of the glumes, is being used to incorporate the character of large glumes in small-grained sorghum.

Large-grained selections are being obtained from the back crosses of BC27 x Korgi and Oklahoma 44/14 x Korgi.

Data from the cross of (first back cross of BC27 x Wiru) x (BC27 x Ng'holongo) suggest that it may be possible to combine gooseneck, well-developed awns and a thicker corneous layer in the endosperm, the latter character being closely associated with weevil resistance. Selection for *Striga* resistance within the variety Dobbs continued.

Rice. Selection has as its objective the production of varieties with stronger straw and less shedding than the standard Kahogo. Of nearly 1000 reselections raised, 153 were retained.

Cotton. Work on breeding and selection has already been summarized (cf. Abst. 1225).

Sisal. F_2 *Agave amaniensis* x *A. angustifolia* hybrids were intercrossed.

Coffee. A preliminary breeding programme was initiated. Reciprocal crosses of H66, KP23 and N39 were effected; these selections were also crossed with *Coffea arabica* var. *geisha*, which is apparently resistant to *Hemileia vastatrix*, and with *C. arabica* var. *amphillo*. N39 and KP423 were in addition crossed with *C. salvatrix*, a species seemingly resistant to leaf rust.

1710 Annual Report of the Department of Agriculture, Colony of Mauritius, for the year 1953 (1954) : No. 37 : Pp. 64.

In addition to variety trials of groundnuts, *Furcraea*, tobacco and other crops, the following investigations are reported:—

Maize. Selection for resistance to *Puccinia polysora* is in progress.

Tobacco. Hybrids between Rg and flue-cured Virginian types proved to be highly resistant to blackshank whereas the Virginian parents were seriously damaged. Selections of the hybrids were back-crossed to the Virginian types. A number of other varieties, including cigar and air-cured tobaccos, are to undergo selection.

1711 Report of the Minister of Agriculture for Canada for the year ended March 31, 1954 : Pp. 151.

Puccinia. Cytological studies were carried out on rust fungi at the Laboratory of Cereal Breeding, Winnipeg. *P. graminis* and *P. coronata* were found to have chromosome numbers of $2n = 12$ and 6, respectively. *P. graminis* may be a polyploid, with $x = 3$.

Wheat. The rust-resistant spring wheat Selkirk [(McMurachy x Exchange) x Redman^3] was licensed (cf. *PBA*, Vol. XXIV, Abst. 1786). It showed good resistance to race 15B of stem rust in 1953. Hybrid lines possessing a more stable type of resistance to sawfly than either Rescue or Chinook were selected, including *Triticum-Agropyron* derivatives. The programme of breeding soft winter wheats for dwarf-bunt resistance was expanded. The soft winter wheat Richmond was licensed; it is less susceptible to dwarf bunt than the varieties grown at present in Ontario.

In breeding hard red winter wheat at Lethbridge, Alba., resistance to the new virus disease known as wheat streak mosaic is receiving attention, as well as resistance to sawfly.

Buckwheat. High yielding, smooth-hulled lines are being developed. Certain intervarietal combinations have displayed heterosis for seed size and yield per acre.

Oats. Two new varieties, Rodney and Scotian, were licensed. With respect to disease resistance, straw strength, size and plumpness of kernel, thinness of hull and test weight per bushel, Rodney is superior to the standard varieties now grown in the rust area of Canada. It is resistant to smuts, Victoria blight, stem rust and most races of leaf rust. Scotian originated from the same cross as Beaver; it shows improvement in earliness of maturity, hull thinness and adaptation to Nova Scotia. A new strain of Garry possessing resistance to Victoria blight was also released. Breeding to improve standard varieties with respect to resistance to diseases and lodging and other characters continued at the different stations. New germplasm is being obtained from wild species; the chromosome-doubling technique is being used to facilitate interspecific hybridization.

Maize. The high-yielding hybrids Warwick 260 (Canbred 260), Warwick 650 (Hesco 427) and Warwick 800 (Hesco 485) were released. They require 85, 110 and 120 days to reach maturity, respectively. Warwick 260 is suitable for use as a husking corn in eastern Ontario; the other two hybrids are adapted for grain production in western and south-western Ontario.

Barley. A high-yielding line from Titan and Vantage underwent final testing in 1953; it is considered to be suitable as a substitute for Vantage. Breeding for resistance to jointworm has been initiated since this pest continues to be a serious problem in Prince Edward Island. A Canadian collection of genetic stocks has been established at Ottawa. The resistance of Anoidium and Rabat to *Helminthosporium sativum* was readily transferred to hybrid progeny. Brandon 3962–4, a selection involving Mensury, Newal, Peatland and Plush in its parentage, exhibited a high degree of resistance to *H. sativum*. Progress was made in crossing *Hordeum vulgare* with *H. murinum*, *H. stenostachys*, *H. bulbosum* and *H. ischnatherum*.

Agropyron. The high yielding wheatgrass Summit (*A. desertorum*) is being multiplied (cf. *PBA*, Vol. XXIV, Abst. 3059). Interspecific hybrids produced for the purposes of cytogenetical and cytotaxonomic investigations include a tetraploid form from *A. dasystachum* x *A. trachycaulum* and a triploid from *A. dasystachum* x $2n$ *A. spicatum* var. *inerme*.

Lucerne. Synthetic varieties with creeping roots are under extensive test in the prairie region.

Potato. A race of *Phytophthora infestans* capable of destroying all the differential hosts used by British and American investigators was isolated from the variety Keswick in New Brunswick. The race is characterized by pathogenicity to all *Solanum demissum* x *S. tuberosum* hybrids possessing the four genes known to govern resistance to *Ph. infestans*. Some forms of *S. demissum* are however resistant to the race. Tests of varieties and seedlings for reaction to viruses and other diseases continued.

Tobacco. The new flue-cured variety Jadel is highly resistant to brown root rot and superior in yield and quality to Delcrest and Hicks when grown under conditions favourable to the development of this disease. The burley Haronic possesses resistance to brown and black root rots but requires further testing before release for commercial production. The inheritance of the mammoth-plant character which originated in a mutant of Delcrest is under investigation. The mammoth type bears 40–60 leaves, slightly larger than those of Delcrest and maturing in the lower portions of the plant at approximately the same time as the leaves of Delcrest. The mammoth character is expected to prove valuable in breeding for increased yield in flue-cured and other types.

Linseed. The early maturing variety Raja (3901D) is to be released; it has shown promise for the black soil districts of Manitoba and Saskatchewan.

Sunflower. From the Morden Experimental Station, Man., progress is reported in breeding (1) a rust-resistant 'stop-gap' synthetic and (2) a rust-resistant single hybrid with the desirable features of Advance. A source of simply inherited resistance is available. Synthetic 1 has outyielded Advance by 14% and is to be extensively tested prior to its possible release in 1955.

Safflower. Breeding and testing are under way at the Cereal Breeding Laboratory, Winnipeg; at Ottawa selection for resistance to rust and root rot is receiving attention.

Fruits. The cooperative project of breeding hardy fruit varieties for prairie conditions continued. The black cherry Sam was introduced by the Summerland Station, B.C. (cf. Abst. 1364).

Musk melon. Harper, a high-quality and *Fusarium*-wilt resistant melon, was introduced.

Tomato. Early Lethbridge, a sister selection of Earlinorth (cf. *PBA*, Vol. XXIII, Abst. 991), is to be distributed, primarily as a canning tomato for southern Alberta.

Soya bean. The new varieties Harosoy, Hardome, Comet and Acme have recently been released. In time taken to reach maturity they range from 100 to 125 days, Acme being the earliest and Harosoy the latest. Harosoy is rapidly becoming the most popular variety in south-western Ontario. Use of the early-maturing varieties Acme and Comet is expected to extend soya bean cultivation into areas with a shorter growing season, such as eastern Ontario.

1712 Goulden, C. H.

Progress Report of the Cereal Crops Division, Central Experimental Farm, Ottawa 1949-1953 (1955) : Pp. 39.

Wheat. Some 400 promising F_4 lines of spring wheat with leaf-rust resistance derived from Illinois 11B8 and stem-rust resistance from McMurachy have been obtained from the cross 4243–49–1 x Acadia. Aneuploids of the varieties Saunders and Cascade are being produced with the aim of determining the position of various genes on the chromosomes. Lines with resistance to frit fly and Hessian fly have been found among the F_5 progeny of a Saunders x Triunfo hybrid. A high-yielding, rust-resistant winter wheat, 0909C, has been developed by crossing a rust-resistant line from a hybrid of a spring wheat and Dawson's Golden Chaff with Junior 6 and Cornell 595. Resistance to race T16 of bunt appears to be associated with resistance to dwarf bunt. Attempts are being made to transfer the bunt resistance of introduced material to adapted varieties. A number of varieties have been released, including Yogo, a hard red winter wheat with good winter hardiness, selected from the cross Minturki-Beloglina x Buffum.

Buckwheat. Efforts are being made to isolate strains with higher combining ability from among the almost sterile, smooth-hulled types.

Oats. Breeding for resistance to lodging and drought is in progress and as a result of crossing cultivated varieties with disease-resistant wild species valuable germplasm is now available as parental material.

Barley. Velvon 11, a six-rowed fodder barley with white aleurone and resistance to smut, has been released together with other varieties. Anoidium and C17152 have been used in breeding for loose smut resistance; Rabat has been used for mildew resistance, a Bolivia x Chevron selection for rust resistance, and Anoidium, Rabat and 3962–4 for root rot resistance, the last-named variety being a hybrid of parentage involving Mensury, Newal, Peatland and Plush. Some promising hybrids of good malting quality have been produced from Olli-Montcalm x [(Newal-Peatland) x

OAC21]. Efforts are being made to incorporate smut resistance from the two-rowed variety Jet into barleys with other desirable characters. Breeding for drought and shattering resistance is being carried out. The variety C13–13 is proving of value in breeding for resistance to jointworm (*Harmolita hordei*). Anoidium, Rabat and Vaughn have consistently shown resistance to a *Helminthosporium sativum* isolate, and selections from Vantage x Rabat, Byng x Rabat, Anoidium x Rabat and Anoidium x Fort have shown good tolerance. In the course of attempts to transfer winter hardiness and disease resistance from wild species to cultivated varieties, it has been found possible to grow hybrids from *Hordeum murinum* x *H. vulgare* and *H. vulgare* x three forms of *H. bulbosum* by means of aseptic culture of the dissected embryos on agar; it is hoped that the sterility of such hybrids may be overcome by the use of chromosome doubling techniques.

Flax. The wilt and rust resistance of some linseed varieties has been transferred to flax and the hybrids thus produced are being backcrossed to the following fibre-flax parents: to Cascade for rust resistance; to Rembrandt for resistance to pasmo; and to Liral Prince and Liral Dominion for high fibre yield.

Raja, an early, rust-resistant linseed selection from a cross of the fibre variety JWS153B9 with the Argentina selection 1025, is to be released in 1955. The linseed varieties CI1153, Crystal and Chinese, and the flax varieties Concurrent and Rembrandt show some tolerance of pasmo.

Safflower. Crosses have been made with the aim of introducing the rust resistance of WO14 into some early-maturing lines with high oil content.

Bean. The main breeding objectives are earliness and disease resistance. Several early selections and some anthracnose-resistant lines have been obtained.

1713 WOODS, J. J.

Progress Report of the Dominion Experimental Station, Saanichton, British Columbia, 1947-1953 : Pp. 51.

Winter oats. Progress has been made in selecting the cross Wintok x Hermit 7, obtained from the Cereal Crops Division, Ottawa.

Strawberry. In recent breeding for resistance to red stele, Magoon, Climax, Fairland, Temple, Red Crop and Sparkle have been used as parents.

Cabbage. Some F_1 hybrids between lines of Golden Acre have displayed superiority in yield, uniformity, earliness and other characters compared with the parental lines. The only feasible method of producing F_1 seed on a commercial scale is considered to be the use of an insect-pollinated self-incompatible line as ♀. Some self-incompatible plants have been found; back crosses are being studied to determine the mode of inheritance of self incompatibility.

1714 HILTON, S. A.

Progress Report of the Dominion Experimental Station, Fredericton, N.B., 1948-1952 (1954) : Pp. 46.

Potato. Testing of seedlings continued with the aim of developing varieties resistant to late blight, common scab and several viruses. The breeding programme has so far resulted in the late-blight resistant varieties Canso and Keswick, which are described in detail (cf. *PBA*, Vol. XXII, Abst. 1251).

Apple. Several seedlings have been developed with a view to the availability of apples at times when supplies are usually short. Some are for use in early autumn, others are late keepers.

Strawberry. Progress has been made in selecting seedlings for disease resistance and other characters from crosses made at the Horticultural Division in Ottawa.

Abstracts of the Annual Meetings of the American Society of Agronomy, Saint Paul, Minn. 1954 : Pp. 97. (Mimeographed).

1715 *Akhter, C. W. & Wells, D. G. An F_2 analysis of the leaf rust resistance of wheat crosses involving La Previsión 25, PI-168732. (p. 64).*

At the Mississippi State College, La Previsión has proved to be highly resistant to leaf rust. In a cross with the susceptible wheat Purple Straw, F_2 ratios of 15 : 1, 3 : 1 and 9 : 7 were obtained for seedling reaction to races 5, 58 and 122 respectively, susceptibility to races 5 and 58 and resistance to race 122 being dominant. Mature-plant resistance was dominant, segregating according to a 15 : 1 ratio. La Previsión was also crossed with Y2817 (Trumbull-Red Wonder-Timstein), Exchange, Klein Titán and RL2327 (McMurachy-Exchange-Redman). For seedling reaction to race 5, two-factor ratios were secured. No susceptible individuals were found in tests for seedling response to races 58 and 122 and for reaction under field conditions, suggesting either similarity of some of the factors for resistance or inadequacy in the population size for detecting susceptible segregates.

1716 *Amirshahi, M. C. & Patterson, F. L. Studies of cold resistance in oats. (p. 64).*

Investigations have been carried out at the

Agricultural Experiment Station, Purdue University, to develop a satisfactory technique for artificial freezing tests. Data from crosses between winter oats and between winter and spring oats indicated that cold resistance is controlled by multiple genes. Cold resistance of F_3 lines was not closely correlated with winter, intermediate or spring habits of growth, when classified by (1) number of days to heading when spring sown or (2) prostrate, intermediate and upright types of growth.

1717 *Barnett, F. L. A karyological survey of several* Bromus *species. (p. 64).*

A detailed account of these investigations is summarized in Abst. 2062.

1718 *Bernard, R. L. & Gregory, W. C. A quantitative genetic study of some character relationships in the peanut. (pp. 64–65).*

On the basis of data obtained during two cycles of recurrent hybridization and selection at the North Carolina State College, the heritability of several characters and their genetic variances and correlations were estimated.

1719 *Bonnett, O. T. Development of the oat plant. (p. 65).*

Three stages are recognized: (1) from sowing to panicle initiation, (2) panicle initiation to heading and (3) heading to grain ripening. The degree of development in each stage differs according to the variety and environmental conditions, and affects seed yield. Information on the life cycle of varieties under different environmental conditions may be useful in breeding for higher yielding ability.

1720 *Brigham, R. D. & Wilsie, C. P. Seed setting and vegetative vigor of Ladino clover selections and their diallel crossed progenies. (p. 65).*

Clones with high or low seed-setting ability were crossed in a diallel manner at the Iowa State College; all were self incompatible but cross compatible. In field studies of the parental clones and their open-pollinated progenies and F_1 progenies, seed setting was found to be highly heritable. Data from the F_1 progenies indicated that high yields of both forage and seed are not incompatible. Recurrent selection is regarded as a promising method of improving Ladino clover.

1721 *Caldwell, R. M., Compton, L. E., Patterson, F. L. & Schafer, J. F. Yield improvement through hybridization of diverse wheat types. (p. 65).*

In breeding for resistance to diseases, insects and low temperature in soft red winter wheats at Purdue University, much germplasm relatively unselected from the standpoint of yield has been combined with that of the best commercial varieties. The hybrid derivatives, however, show significant improvements in yield attributable to genes or genic interactions other than those affecting response to the above-mentioned adverse factors.

1722 *Carnahan, H. L. & Garber, R. J. The present status of intergeneric hybridization* (Lolium *x* Festuca) *at the US Regional Pasture Research Laboratory. (p. 66).*

An attempt was made to produce the allopolyploid *L. perenne* x *F. elatior* by doubling the chromosome number of the parents prior to crossing. Successive selection of tillers from mixoploids obtained by colchicine treatment of the seeds resulted in apparently $4x$ clones. Twelve plants with $2n = 21$ chromosomes were obtained from *L. perenne* x *F. elatior*. Rechecking of parental chromosome numbers indicated that the *Lolium* parent had reverted to the $2n$ condition. Tillers of the 12 sterile triploids were treated with colchicine; a polycross nursery of the resulting clones with $2n = 42$ has been established.

1723 *Carnahan, H. L. & Hill, H. D. Chromosome distribution in the progenies of pentaploid ($2n = 35$) reed canarygrass. (p. 66).*

Progenies from two of the three open-pollinated pentaploids of *Phalaris arundinacea* studied varied in chromosome number from $2n = 28$ to 42, types with 28 or 42 predominating. Approximately 10% of the progeny of the third $5n$ form showed chromosome numbers in excess of 42, with 56 as the maximum. Correlations between chromosome number and leaf width were nonsignificant.

1724 *Coffman, F. A. Temperature—a potent factor in oat adaptation. (p. 66).*

Analysis of data from the uniform tests included in the cooperative oat breeding programme of the USA indicated that temperature is a more potent factor influencing varietal adaptation of both winter and spring oats than was previously recognized.

1725 *Day, A. D. Association between diastatic power and certain visible characteristics in barley. (p. 67).*

In investigations at Arizona University, diastatic activity was associated with (1) the character pair of rough *vs.* smooth awns determined by a gene in linkage group V and (2) the character pair of the two-rowed *vs.* the six-rowed condition determined by a gene in linkage group I. Two-rowed segregates had a significantly higher mean diastatic power than six-rowed types. Diastatic activity was not associated with black *vs.* white hulls, naked *vs.* covered kernels or blue *vs.* white aleurone.

1726 *Earhart, R. W., Wallace, A. T. & Chapman, W. H. Breeding crown rust resistant oats in Florida. (p. 67).*

A discussion is given of three systems of breeding for crown rust resistance, using (1) one or more major genes, (2) a group of genes conferring moderate resistance and (3) a reinforced combination of genes, each producing a similarly high type of resistance. Resistance due to major genes is usually defeated by the occurrence of new physiological races of the pathogen. A series of successive fungal variations would be required to overcome the second type of resistance, use of which could therefore extend the commercial life of a variety. System (3) depends upon testing techniques capable of detecting specific genes producing equal degrees of resistance.

1727 *Eckhardt, R. C. Techniques in using male sterile cytoplasm and a restorer gene in corn. (p. 67).*

The maize inbred Mp307 contains a dominant gene for the restoration of fertility in plants carrying the Texas source of male-sterile cytoplasm. A method of simultaneously incorporating male-sterile cytoplasm and the restorer factor into inbreds is outlined (cf. *PBA*, Vol. XXIV, Abst. 159).

1728 *Everson, E. H. The genetics of yield differences associated with awn barbing in the barley hybrid (Lion x Atlas^{10}) x Atlas. (p. 68).*

An association of semismooth awns and high yield in a backcross progeny involving the transfer of a small segment of chromosome V from Lion to Atlas has been previously reported (cf. *PBA*, Vol. XXIII, Abst. 1193). Further investigations have indicated that this superiority in yield over the ordinary form of Atlas was determined by linked genes located between loci *R* and *S*.

1729 *Fitzgerald, P. J., Caldwell, R. M. & Nelson, O. E. (Jun.). Inheritance of seedling resistance to five races of leaf rust of wheat. (p. 68).*

Inheritance of seedling resistance to races 5, 9, 15, 65 and 76 of *Puccinia rubigo-vera* var. *tritici* was studied in crosses of the highly resistant soft red winter wheat Purdue 3369–61–1–1–10–8 with several other varieties. Data from the crosses with American Banner, Seneca and Butler indicated that resistance to races 5, 9, 15 and 76 was controlled by different single dominant genes, those for resistance to races 15 and 76 being linked with a cross-over value of approximately 5·5%. Resistance to race 65 depended upon duplicate recessive factors. Genes at two closely linked loci governed resistance to race 9 in crosses of the Purdue selection with Mediterranean and Wabash, which are also resistant to race 9. Malakof possessed a dominant and independently inherited gene for resistance to race 76.

1730 *Frey, K. Mutant strains of oats derived from X-rayed seeds. (p. 68).*

X-irradiation of Huron resulted in mutants with (1) shorter and stiffer straw, (2) stem-rust resistance or (3) earlier date of heading (cf. *PBA*, Vol. XXIV, Abst. 1893). Under conditions of protection from stem-rust infection, a number of the mutants yielded up to 60 bushels per acre.

1731 *Gregory, W. C.* Arachis hypogaea *L.: X-ray breeding. (pp. 68–69).*

X-irradiation of seeds at the North Carolina State College induced mutants showing changes in (1) reaction to leaf-spot diseases, (2) plant habit and size, (3) proportion of vegetative to reproductive branches and (4) vegetative vigour. Higher yielding and more vigorous varieties were obtained by selection of irradiated material. Alterations in plant habit and size led to types more suitable for mechanical harvesting.

1732 *Hanson, C. H., Robinson, H. F. & Comstock, R. E. Biometrical studies of yield in segregating populations of Korean lespedeza. (p. 69).*

One of the aims of breeding at the North Carolina Agricultural Experiment Station is the development of later maturing varieties producing high yields of both seed and forage. Late-maturing lines recently introduced from Asia were crossed with naturalized stocks. It is stated that the hybrid populations thus obtained have been used to estimate genetic and environmental variances for forage and seed yields.

1733 *Harris, W., Heyne, E. G. & Johnston, C. O. The inheritance of leaf rust reaction in crosses among the eight differential leaf rust varieties and Pawnee. (p. 69).*

Investigations on the seedling reactions of F_1, F_2 and F_3 plants from crosses among the wheats used for differentiating leaf-rust races in the USA indicated that one or two factors explain the difference between the reaction of any two varieties. The genes determining resistance may be dominant, partially dominant, intermediate or recessive. From the cross Webster x Mediterranean it was concluded that Webster contains a completely dominant factor for resistance to race 5 and an incompletely dominant factor for resistance to race 9. These two factors are independent. Data from Democrat x Malakof revealed that Democrat has two factors for reaction to race 9 and Malakof one factor for resistance to race 15. No segregation for response to races 9, 15 and 58 occurred in the cross Democrat x Mediterranean. Webster and Brevit apparently have the same factor for resistance to race 9.

1734 *Heermann, R. Inheritance of stem rust reaction in durum and Khapli emmer crosses with particular reference to race 15B. (p. 69).*

Khapli emmer and the *Triticum durum* wheats CI3255 from Tunis, PI94701 from Palestine and selection RL1714 from Golden Ball x Iumillo-Mindum are suitable as parents in breeding resistance to race 15B (cf. *PBA*, Vol. XXIV, Abst. 253). The genes for resistance in these *T. durum* varieties are allelic or very closely linked. F_2 and F_3 progenies from crosses of Khapli with these varieties contained some susceptible segregates.

1735 *Helmerick, R. H. & Pfeifer, R. P. Differential varietal responses of winter wheat germination and early growth to controlled limited moisture conditions. (p. 70).*

A full version of this paper has been summarized in Abst. 941.

1736 *Jugenheimer, R. W. Hybrid corn goes international. (pp. 70–71).*

A summary of the full text of this paper is given in Abst. 1944.

1737 *Klinck, H. R. & Lods, E. A. Proportion of hull as a factor of quality in oats. (p. 71).*

As the result of investigations at the Macdonald College, Quebec, it is concluded that the hull or caryopsis percentage is a more accurate criterion of varietal differences in quality than weight per bushel.

1738 *Koo, F. K. S. & Myers, W. M. Deleterious effects caused by interpollination of diploid and tetraploid rye varieties. (p. 71).*

In experiments on the effects of interpollination between Tetra Petkus and either of the $2n$ varieties Emerald and Imperial under bagged conditions at the University of Minnesota, the reduction in seed set, compared with the amount of seed set when each variety was bagged alone, was greater in $2n$ than in $4n$ rye. The seed plumpness and germinability of Tetra Petkus were deleteriously affected by interpollination with $2n$ rye.

1739 *Leng, E. R. Rate of tassel development in corn inbred lines and hybrids and its variation with planting date. (pp. 71–72).*

In investigations at the University of Illinois, inbred lines and hybrids of maize differed in (1) total length of the period between planting and anthesis and (2) relative lengths of the periods between (*a*) planting and emergence, (*b*) emergence and tassel initiation and (*c*) tassel initiation and anthesis. Planting date had a much greater effect upon the time required for development up to the stage of tassel initiation than upon the duration of the period (*c*). The interactions of date of planting x line and date of planting x hybrid were significant. Rate of tassel development and mean daily temperatures were closely related. The information gained should prove useful in studying the inheritance of the rate of reaching maturity and in planning planting dates so that flowering lines are synchronized in the production of single and double hybrids.

1740 *Moore, E. L., Drolsom, P. N. & Clayton, E. E. Performance of black shank resistant tobacco varieties in the presence of parasitic nematodes and black shank. (p. 72).*

In North Carolina the commercial variety Dixie Bright 101 has displayed a high degree of black shank resistance but susceptibility to nematodes. Hicks developed normally on nematode-infested soil. Selections from crosses of Hicks and Bottom's Special with black-shank-resistant lines have shown superiority over Dixie Bright 101 in disease resistance.

1741 *Nielsen, E. L. Cytological disturbances influencing self- and cross-fertility in smooth bromegrass. (p. 72).*

Mutual pollination of two moderately fertile plants of *Bromus inermis* resulted in a highly pollen-sterile F_1; seed set from open pollination was very low and from selfing practically nil. A large proportion of the microsporocytes died during prophase, when a considerable amount of the RNA fraction passed into the cytoplasm, bodies resembling nucleoli being formed. Surviving microsporocytes often contained large numbers of pyronin-positive bodies. Other aberrations included B chromosomes, asynapsis, multivalents at anaphase, stickiness, and failure of gamete formation in young microspores.

1742 *Permenter, J. W., Harvey, P. H. & Comstock, R. E. Relations of eight marker gene pairs with certain quantitative characters in maize.* (*pp. 72–73*).

Preliminary F_2 analyses have indicated that (1) for seven of the eight marker loci investigated the homozygous recessive condition has a significantly detrimental effect upon yield and (2) cases of overdominant effects upon yield may occur.

1743 *Poehlman, J. M. & Cloninger, C. K. Missouri Early Beardless as a source of smut resistance in breeding winter barley.* (*p. 73*).

From crosses between lines of Missouri Early Beardless and awned varieties of the Tennessee Winter type the following selections have been developed: the commercial variety Mo.B–400, resistant to *Ustilago nuda* (cf. *PBA*, Vol. XXIII, Abst. 1184); B575 (Admire x Mo. Early Beardless Sel.), resistant to specific races of *U. nuda* and *U. nigra*; and B637 (Michigan Winter x Mo. Early Beardless Sel.), resistant to *U. hordei* but susceptible to loose smut. B575 is being multiplied for possible distribution.

1744 *Reitz, L. P. Effectiveness of uniform testing in regional nurseries.* (*p. 73*).

Statistical analysis of data from uniform tests of approximately 30 winter wheat varieties at an average of 12 stations in the central and southern Plains of the United States during the period 1932 to 1951 has indicated that such regional trials provide reliable information on varietal adaptation and quickly reveal outstandingly good varieties.

1745 *Robinson, H. F., Comstock, R. E. & Harvey, P. H. Genetic variances in open-pollinated varieties of corn.* (*p. 74*).

Analysis of biparental progenies of the open-pollinated maize varieties Jarvis, Weekley and Indian Chief indicated that (1) for the eight characters studied the estimate of dominance variance was less than the estimate of additive genetic variance and (2) an appreciable amount of additive genetic variance was expressed. No evidence was obtained that overdominance was important as a source of genetic variability.

1746 *Simons, M. D. Inheritance of resistance of the oat selection P.I. 186603 to specific races of crown rust.* (*p. 74*).

In the seedling stage PI185503 is immune from the common races of crown rust, moderately resistant to race 263 and susceptible to *Helminthosporium victoriae*. Data from a cross with Landhafer indicated that the susceptibility of PI186603 to *H. victoriae* depended upon a single dominant gene. The F_2 of this cross and two others with Santa Fe and Trispernia contained segregates completely susceptible to the common crown-rust race 202, indicating that PI186603 did not possess genes for crown-rust resistance allelic to those carried by the other three varieties.

1747 *Smith, D. L. Variation and inheritance of beta-carotene in alfalfa.* (*p. 74*).

Content of β-carotene in lucerne was found to be inherited on a quantitative basis.

1748 *Stanford, E. H. Aneuploidy in* Medicago sativa. (*pp. 74–75*).

The following aneuploids have been developed at the California Agricultural Experiment Station: (1) 30-chromosome plants of *M. sativa* from twin seedlings, (2) 31-chromosome individuals from [*M. falcata* ($2n = 16$) x *M. sativa* ($2n = 32$)] x *M. sativa* ($2n = 32$), and (3) plants with $2n = 25$–34 from *M. sativa* ($2n = 16$) x *M. sativa* ($2n = 32$). The possible value of such forms in establishing linkage groups is pointed out.

1749 *Taylor, N. L. The inheritance of pubescence and its relation to leafhopper resistance in alfalfa.* (*p. 75*).

Investigations on crosses of the nonpubescent type with hairy Arabian lucerne at the Kentucky Agricultural Experiment Station suggested that many genes determine pubescence. This character is apparently associated with leafhopper resistance but would be difficult to transfer to commercial varieties.

1750 *Tatum, L. A. A study of the relationship of yields of dent corn inbreds and their topcross hybrids.* (*p. 75*).

Correlations involving the yields of S_0, S_1 and S_2 strains and those of their respective top-crosses are listed. Three of the relationships were highly significant, e.g. between S_0 inbreds and S_2 top-crosses, S_1 inbreds and S_1 top-crosses, and S_1 top-crosses and S_2 top-crosses.

1751 *Tegenkamp, T. R. & Finkner, V. C. Inheritance of albinism in oats and the effect of carbohydrates on rust sori development of albino oat leaves.* (*pp. 75–76*).

Loss of a single pair of chromosomes containing the major factors for chlorophyll production caused the appearance of albino segregates in the progenies of several crosses. Use of Ukraine and Santa Fe as parents was associated in some combinations with allosyndesis, resulting in monosomic plants; transmission of the univalent was variable. A supply of carbohydrates was found to be essential for the development of rust sori.

1752 *Vogel, O. A. Preliminary varietal trials with early generation hybrid selections of semi-dwarf winter wheat. (p. 76).*

Semidwarf selections from Norin 10 x Brevor have exhibited considerable improvements over Brevor in grain yield and shortness of straw at Pullman and Walla Walla, Wash. The genetics of the semidwarf habit is apparently complex. Under certain conditions Norin 10 contributes a relatively high degree of male sterility to a large proportion of its progenies; line 14 is however a normal pollen-producer.

1753 *Wells, D. G., Akhter, C. W. & Caffey, H.R. Leaf rust reaction genetics in F_3 of the wheat crosses Michigan Amber x a Fronteria*-Hardired derivative and Purplestraw x Tennessee 47-1-20. (p. 76).*

The adult-plant resistance of Coker 47–27 (Fronteira-Hardired) to leaf rust proved to be dominant to the field susceptibility of Michigan Amber and to depend upon a single gene derived from Fronteira. The cross Purplestraw x Tennessee 47-1-20 revealed that the adult-plant resistance of the latter variety was determined by one dominant factor; according to the data from most F_3 lines the seedling resistance of Tenn. 47-1-20 to races 5, 58 and 122 was recessive and dependent upon two duplicate factors. Nine F_3 lines, however, varied in their reactions to the three races, suggesting that recombination had occurred among three closely linked factors usually inherited as a group and behaving as a single factor, to give, with a gene in another linkage group, a segregation ratio indicative of two duplicate factors.

1754 *Welsh, J. N. & Johnson, T. Inheritance of reaction to race 7A and other races of oat stem rust. (p. 76).*

Study of Garry x Exeter, Garry x Roxton, RL1225 x Ajax, Lanark x Ajax and Santa Fe x RL1942 indicated that three genes, *A*, *B* and *C*, condition resistance to race 7A and races 1–8 and 10–13 (cf. *PBA*, Vol. XXIV, Abst. 2882).

1755 *Wortman, L. S., Wellhausen, E. J. & Reyes, P. Tropical corn breeding in Mexico. (p. 77).*

Tropical varieties and hybrids are apparently more widely adapted than maizes from higher altitudes. In developing hybrids from tropical types, the chief characters still required are reduced height of plant and ear and increased shank length. Resistance to *Helminthosporium* spp. is satisfactory. Uniformity in the desired characters has been obtained in the S_3. The use of flint-dent crosses in breeding yellow maize is regarded as a promising method of improving yield without diminishing earliness.

1756 *Zillinsky, F. J. Cross compatibility relationships among species of* Avena. *(p. 77).*

Crosses involving species with the same chromosome number resulted in good sets of seed, the F_1 hybrids being highly self fertile. In crosses of the types $4n$ ♀ x $6n$ ♂ and $4n$ ♀ x $2n$ ♂ seed was produced less readily and the F_1 hybrids were highly self sterile; seed was obtained by back-crossing with either parent species, using the hybrid as ♀. Only a few nonviable seeds were secured from $6n$ ♀ x $4n$ ♂ combinations. The crosses $6n$ ♀ x $2n$ ♂, $2n$ ♀ x $4n$ ♂ and $2n$ ♀ x $6n$ ♂ failed to give normal seeds. Polyploids of *A. strigosa* ($2n = 28$), *A. abyssinica* x *A. strigosa* ($2n = 42$) and *A. abyssinica* x *A. sativa* ($2n = 70$) were induced by colchicine treatment. Used as the ♀ parent, the tetraploid of *A. strigosa* produced seed more abundantly than the diploid form in crosses with $4n$ and $6n$ species. Seed was readily obtained by crossing the $4n$ and $2n$ forms of *A. strigosa*, the resulting triploids being partially self fertile. The combination *A. strigosa* $4n$ x *A. abyssinica* was also fertile.

1757 *Buller, R. E. & Pitner, J. B. Comparative behavior of alfalfa varieties in the Mesa Central of Mexico. (p. 78).*

In tests in the above region, with a temperate climate and altitude of 6500–8500 ft., nonhardy types of lucerne have exceeded hardy types in annual production, since the latter undergo a period of semidormancy. In longevity and disease resistance the hardy types are superior to the nonhardy.

1758 *Portz, H. L. & Jackobs, J. A. A study of the frequency of cyanogenic characteristics in white clovers. (pp. 79–80).*

It is suggested that the wide differences detected in the frequency of cyanogenic plants raised from different seed lots of certified Ladino clover may be the result of natural selection operating through temperature and photoperiod. Under critical photoperiodic conditions, cyanogenic characteristics may be associated with increased flowering, and thus with increased seed production, among some individual plants and their descendants. The possibility of outcrossing to other types of white clover also requires to be considered as an explanation of the observed genetic shift.

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* Presumably Fronteira.

1759 **Report of the Administrator of Agricultural Research of the United States Department of Agriculture, 1953** : Pp. 492.

The report includes a survey of work carried out by the US Bureau of Plant Industry, Soils and Agricultural Engineering, giving an account of recent progress in breeding field and horticultural crops. Most of the numerous new varieties described have already been referred to in *Plant Breeding Abstracts*.

1760 **Agricultural Research Report of the Virginia Agricultural Experiment Station, July 1, 1950-June 30, 1953** (1953) : Pp. 190.

In addition to varietal tests of cereals, grasses, clover, *Lespedeza*, potato, cotton, groundnut, tomato and soya bean, the following work has been carried out:—

Wheat. Breeding for resistance to rusts and mildew and for adaptation to eastern Virginia is in progress. Several lines superior in yield to Thorne, and other lines with higher disease resistance than Thorne and Vahart, have been obtained. Nudel, Seneca, Thorne and VPI131 are resistant to soil-borne mosaic virus.

Oats. Breeding for yield and winter hardiness is being carried out. Two promising varieties are CI6718, a hybrid from Lemont, and CI6571 (Lee-Victoria x Fulwin).

Spring oats are being bred for resistance to fungi and for straw and grain quality. Selections from the cross Andrew x Landhafer are promising.

Maize. Two yellow hybrids, VPI645 and 802, and one white hybrid, VPI900W, have been released. Their yields in tests were approximately 10% higher than the average for standard varieties.

The high oil and high protein characters of some Illinois inbreds are being transferred to lines adapted to Virginia.

The early hybrids Ohio C–54, Ohio W–64 and Pioneer 303 have given good yields in tests in the northern Shenandoah Valley. At the Holland station, Ohio C–54 was the highest yielding of 16 early varieties.

Barley. An attempt is being made to produce a Wong type with improved disease resistance, grain quality and standing ability. The association between disease resistance and other characters is under investigation.

Forage grasses. At five stations in Virginia, the cocksfoot variety Virginia Commercial has proved higher yielding and better adapted than British, Danish and New Zealand varieties, but its hay quality and disease resistance were inferior.

Southern strains of brome have consistently outyielded northern strains.

Alta and Kentucky 31 fescue were superior in yield to commercial strains of meadow fescue.

Lucerne. Kansas Common has been exceeded in yield by Williamsburg in eastern Virginia, by Atlantic in all parts except the east and by Buffalo in most sections of the state. The yields of these four varieties at five stations are tabulated.

Breeding for combined resistance to several diseases is in progress; also breeding for resistance to stem nematode.

Clover. Kenland and other red clover varieties adapted to Virginia have consistently given higher yields than imported varieties or unadapted varieties from neighbouring states. In a study of the yields of four white clover varieties when grown with different grasses, it was found that Ladino was the only strain able to compete successfully with *Dactylis glomerata*, but that all four varieties (Ladino, S–100, Virginia white and Kent wild white) did well with *Poa pratensis*.

Birdsfoot trefoil. Adaptation to different localities is being studied.

Tobacco. In addition to varietal trials, breeding for quality and disease resistance is in progress. Virginia Gold has consistently given higher yields than all other flue-cured varieties tested. The varieties Vesta 1, 5 and 8 are black-shank resistant, higher yielding than the older Vesta varieties and more tolerant of root rot. Lines with multiple disease resistance are being developed from Vesta, Rg (shade tobacco), Vamorr (mosaic resistant), Oxford 26 and Dixie Bright 27 (Granville wilt resistant), Ross Giant (vegetative vigour) and others.

A number of lethal strains of tobacco mosaic virus (TMV) and a lethal strain of cucumber mosaic virus produce severe necrotic symptoms in several tobacco varieties which do not carry the *glutinosa* factor for resistance to TMV. In the varieties so far investigated, this reaction appears to be genetically determined.

Flue-cured tobacco varieties carrying resistance to Granville wilt and black shank also show some resistance to *Fusarium* wilt.

High black shank resistance combined with immunity to common mosaic and high tolerance of root rot has been obtained in some burley lines.

Among dark fire-cured tobaccos, Walker's Broadleaf has been found highly resistant to nematode root rot.

Apple. Varietal differences in behaviour under low O_2 and high CO_2 storage conditions are noted.

Groundnut. The recently released variety 46–2, selected from Virginia Bunch Large Commercial, is widely adapted and high yielding and produces a high proportion of large kernels. PI153342 was the most resistant of 113 erect varieties to *Cercospora arachidicola* and PI149637 the most resistant of 49 prostrate varieties. Of 12 varieties tested at the Holland station, Valencia had the highest protein content and Light Skinned and Georgia the highest oil. Variety 149–637 had the highest content of the B vitamins, having 40% more B_1 and 60% more B_2 than the average for the 12 varieties. The protein content of the vegetative parts of most varieties was inversely related to the protein content of the seed.

Peach and nectarine. Redchief and Cavalier nectarines and some nectarine and peach seedlings have shown promise.

Grape. Breeding and testing of new varieties are being continued. The introduced hybrids Seibel 13053 and Seyve Villard 5–376 have shown good growth and yield and appear to be fairly well adapted.

Pole bean. Breeding has produced some high-yielding green snap beans of good quality, such as Va. 220, 236, 214 and 219. Carter Wax is a good wax-pod variety and Duncan an early and prolific strain producing white beans of the Boston Navy type.

Lima bean. Some promising lines combining nematode resistance with the desirable characters of Early Thorogreen and Clarks Bush are being tested.

Soya bean. The varieties Dorman (cf. *PBA*, Vol. XXIII, Abst. 778) and Jackson (cf. *PBA*, Vol. XXIV, Abst. 1519), which have recently been released, are of similar maturity to S–100 and Roanoke respectively. Jackson is adapted to south-east Virginia.

1761 **Annual Report of the Agricultural Experiment Stations, University of Florida, for the fiscal year ending June 30, 1953** : Pp. 354.

In addition to the work summarized below, varietal trials of cereals, forage grasses and legumes, cotton, citrus fruits, melon, tomato, peas, beans and other fruits and vegetables have been carried out. Breeding and selection of tung, sugar cane, citrus fruits, cantaloupe, water melon and beans are also briefly reported.

Oats. Two new crown-rust resistant varieties, Sunland and Seminole, have been released (cf. *PBA*, Vol. XXIV, Abst. 1901). Further selections with superior resistance to crown rust, stem rust and culm rot have been obtained. New races of crown rust have damaged the previously resistant varieties Southland and Victorgrain.

Maize. A number of lines crossed with the hybrid F44 x F6 have given higher yields than Dixie 18. Dixie 18 and Coker's 811 proved the best yellow and white hybrids, respectively, with regard to standing ability, weevil resistance and yield. Nineteen hybrids and six inbreds have shown promise in tests for resistance to *Helminthosporium turcicum*. Corneli 11 (Cuba M–11) has outyielded the best Florida hybrids.

Barley. Some selections with superior resistance to *Helminthosporium sativum* and powdery mildew have been obtained.

Bahia grass. Narrow-leaved Pensacola selections have proved more frost-resistant than broad-leaved types. Three self-sterile Pensacola lines from Georgia are being used as seed parents in crosses with Argentine Bahia, Lassiter's Giant Bahia and Bahia 162,902.

Lupin. Satisfactory yields have been given by some virus-resistant or tolerant yellow lupin selections; further selection is in progress. Florida 2, selected from Au 9737 and similar in yield and habit to common bitter blue lupin, has shown resistance to damping-off seedling disorders and a leaf-spotting disease and appears to be adapted to central Florida.

Cotton. Sealand is undergoing selection for improved lint quality, vigour and habit. The variety EH808 proved superior in yield of seed cotton to all other varieties tested.

Kenaf. The S_2 and S_3 of selected lines appear to be breeding true for a high degree of resistance to *Colletotrichum* tipblight. Selection for late maturity is being undertaken in crosses of the El Salvadorian variety with Javanese introductions and the variety Tingo María.

Ramie. A variety obtained from Brazil, PI205492 Murakami, has given significantly higher yields than the standard variety PI87521.

Groundnut. A new variety, Florispan Runner (334A), selected from Ga.207–3 x (Small White Spanish x Dixie Giant), was released in 1953 (cf. *PBA*, Vol. XXIV, Abst. 3323). Its pod and seed characters and runner habit resemble those of Spanish, the seeds blanch well and it has given high yields in varietal tests.

Tobacco. Progress has been made in breaking the close linkage between nematode resistance and narrow leaf in flue-cured varieties, some lines with good resistance and medium leaf width having been obtained. Plants with double chromosome number induced by colchicine treatment are to be crossed with three nematode-resistant species.

Selection 881 from RK25 was high yielding, of good quality and comparable in black-shank resistance to Rg.

Tomato. In a series of tests for rapidity of post-harvest ripening and for colour quality, Rutgers proved superior to the other varieties tested. The selection VCL11, a very prolific early variety with the same resistances as Manalucie (cf. *PBA*, Vol. XXIII, Abst. 3082), is now ready for release. Selections from CASt (VCL11 x STEP206) and from ARSEW28–Bk–1–2 (ARStW6 x VCL7) are promising. Selection H582–Bk–2 is being crossed with Manalucie in an attempt to combine the high root-knot resistance of the former with the fruiting characters and resistance to other diseases of the latter. A Mexican strain of *Lycopersicon pimpinellifolium* appears to be resistant to all races of *Phytophthora infestans*. Attempts are being made to obtain pure breeding stock from the variable line PI115201, which is highly resistant to *Phoma destructiva*, by selection, preparatory to hybridization with large-fruited material such as Manalucie.

1762 **Research for living. Annual report 1954.**
Bull. N. Dak. agric. Exp. Sta. 1955 : No. 396 : Pp. 39.

Wheat. The two Kenya wheats 338AA and and 338AC, both highly resistant to race 15B of stem rust, have been extensively used in breeding 15B-resistant hard red spring hybrids. Sentry (Ld356), an early-ripening, stiff-strawed durum wheat with some tolerance of stem rust 15B, was released in 1954. Five new 15B-resistant hybrid selections have been obtained, three of which derive their resistance from Khapli emmer and two from a Palestinian durum variety.

Maize. Two new hybrids, Nodakhybrid 306, a yellow dent, and Nodakhybrid 305, a yellow flint, have performed well in western and central parts of the state.

Barley. B103, a selection from Kindred x Titan which is similar in disease reaction to Kindred (L) but longer-strawed and higher-yielding, has continued to do well in trials. The effects of mutations induced by irradiation are being studied in Kindred and B103.

Sudan grass. Breeding and selection for low HCN content combined with other desirable characters are in progress.

Potato. Some good white selections of high table quality have been obtained. Breeding of red selections for table quality and resistance to scab, virus and blight is being continued.

Flax. Breeding for rust and wilt resistance and desirable plant type is in progress.

1763 **Research and Alaskan agriculture, 1950-51.**
Bienn. Progr. Rep. Alaska Exp. Sta. 1950–51 (1953) : Pp. 29.

Oats. The Swedish variety Golden Rain is adapted to Alaskan conditions in respect of earliness and yield. Crosses have been made between early and late oats with the aim of obtaining further varieties combining earliness with high yield.

Barley. The Swedish variety Edda, released in 1951, has proved superior to Trapmar in yield and resistance to lodging.

Lucerne. Crosses have been made between yellow and purple-flowered varieties in an attempt to combine the winter hardiness of the former with the forage qualities of the latter.

Lettuce. The newly released USDA variety Alaska is superior to other commercial varieties in yield, size, type of head, resistance to bolting and adaptation to Alaskan conditions (cf. *PBA*, Vol. XXIV, Abst. 573).

Other crops. Varietal trials of tree and bush fruits, potato, cabbage and other vegetables have been carried out.

1764 Contribución de la Estación Experimental de Pergamino al progreso de la agricultura regional. (**Contribution of the Pergamino Experimental Station to progress in the agriculture of the region**).
Circ. Estac. exp. Pergamino 1954 : No. 1 : Pp. 11. (Mimeographed).

The achievements of the Pergamino station in Argentina, in addition to those mentioned below, include the production of lucerne selections resistant to root rot, various improved selections of *Vicia sativa*, *Trifolium repens*, *T. pratense*, *Lotus corniculatus*, *Bromus catharticus*, *Phalaris minor*, *Ph. tuberosa* and a number of other graminaceous species, and synthetic varieties of sunflower.

Wheat. Selections under observation include lines combining resistance to stem and leaf rust, smut and *Septoria* spp. with good milling and baking quality.

Maize. The double-cross hybrid Pergamino 2 has been released; other hybrids possessed of resistance to lodging and foot rot are in course of production. Lines from local maize material are being contributed to the international bank of maize germplasm.

Flax. New linseed varieties created include Charrúa MAG and Pergamino Pampa, the former resistant to wilt and rust and high in oil content and quality, the latter being a superior variety to Querandí, which it will replace. Some of the newer selections combine resistance to wilt, rust, pasmo and lodging with yield and good industrial quality. The linen flax Calchaquí is wilt resistant and Mapún 52, Calchaquí 53 and Mocoví are rust resistant. Newer selections combine resistance to wilt and lodging with immunity to rust and high yield of fibre of good quality. Ranquel is a good dual-purpose variety.

Potato. Line Pergamino 07 is characterized by short dormancy period and is promising for the area of Rosario; other clones suitable for the south-eastern region of the province of Buenos Aires have been produced.

1765 VOELCKER, O. J.
Annual Report of the Department of Agriculture, Federation of Malaya, for the year 1953 (1954): Pp. 60.

In addition to the breeding and selection of rice, pineapple, oil palm, soya bean and groundnut, varietal trials of rice, ramie, sweet potato, cacao, durian, brinjal and soya beans have been carried out. A clonal collection of tea has been established and varietal collections of rice, sweet potato and banana maintained and enlarged. Other work includes the following:—

Manila hemp. Tangangon was the highest yielding of six varieties and has shown high resistance to *Marasmius subplexifolius*.

Coffee. At Serdang, the yield of Uganda coffee was decreased by heavy shading while that of Liberian coffee was adversely affected even by light shading. The *arabica x liberica* hybrids Kalimas and Kawisari gave low yields under all degrees of shading.

Cacao. Five East Indies Trinitario progenies were superior to Amelonado in pod yield but four of them were inferior in the wet cacao and bean content of the pods. The progeny of the selection T.IN.A seems to be promising.

Seedlings from open-pollinated Upper Amazon seed imported from the Gold Coast appear to be the most vigorous of all material under trial at Serdang.

Oil palm. Progeny trials of dumpy palms, which continue to be the highest yielding types at Serdang, and of Deli x *pisifera* and Deli x Deli, are in progress.

Rambutan. Of a total of 18 clones, the highest yielding were R 1, 9 and 5 at Degong, R 5, 1, 86 and 6 at Ipoh and R 86, 10 and 3 at Serdang. R11 produces an acid fruit suitable for canning.

Pineapple. The inoculation of six plants of Sarawak with mealy bugs (*Dysmicoccus brevipes*), obtained from wilted Singapore Spanish, resulted in green spotting of the leaves and, in two plants, in the appearance of the symptoms of mealy-bug wilt.

Leucaena. *Leucaena glabrata* x *L. glauca* appears to be more vigorous than *L. glauca* and is a promising shade plant for cacao.

Strawberry. In a trial of Cambridge seedlings, 448 outyielded 560 and 261 at Cameron Highlands.

BLACK, M. A. (EDITOR)
Report of the Seventh Science Congress of the Royal Society of New Zealand, held at Christchurch, May 15-21, 1951 (1953) : Pp. 256.

The following papers of interest to plant breeders are reported:—

1766 *Smith, H. C. Strawberry fungous diseases in New Zealand. (pp. 47–48).*

Ettersburg, Prolific and two promising introduced varieties, Climax and Perle de Prague [Pearl of Prague] are almost immune to *Phytophthora fragariae*. Partial resistance to leaf spot (*Mycosphaerella fragariae*) is shown by Captain Cook, Perle de Prague and Prolific, and to *Verticillium* wilt and powdery mildew (*Sphaerotheca humuli*) by Prolific.

1767 *Cruickshank, I. A. M. Fungous diseases of peas in New Zealand. (pp. 52–55).*

Ten pea varieties resistant to wilt (*Fusarium orthoceras*) are noted.

1768 *Lamb, K. P. Insect resistance in certain varieties of plants. (p. 92).*

Some examples of insect resistance in plants are given and briefly discussed.

1769 *Frankel, O. H. Hereditary effects of some physical and chemical agents applied in medicine and agriculture. (pp. 242–45).*

The danger that slightly deleterious mutations arising in crop plants from cytological disturbances caused by organic selective weed killers and similar compounds may inadvertently be selected and perpetuated during the breeding and multiplication of stock seed is discussed.

1770 *Langridge, J. Chemical mitogenesis and its significance.* (*pp. 254–55*).

Treatment of mitotic cells with pyrogallol or α-naphthalene acetic acid results in disturbances such as interference with cytoplasmic enzyme systems, disruption of the polar organization and chromosome lagging and breakage. Both mutagens are highly toxic, causing irreversible pycnosis and death after five hours.

1771 *Corkill, L. Pasture plant breeding.* (*p. 255*).

The breeding of cross-pollinated pasture plants is briefly discussed with particular reference to the advantages of using synthetic strains.

1772 **Annual Report of the Department of Agriculture and Stock, Queensland, for the year 1953-54** (1954) : Pp. 109.

In addition to the work summarized below, varietal trials of potato, tobacco, linseed, sunflower, papaya and soya beans have been carried out.

Wheat. A rust-resistant line of Puora has been developed through back-crossing and is now to be selfed. A number of unnamed hybrid selections have shown high resistance to prevalent forms of stem rust.

Oats. The variety Bovah, which has high field resistance to crown rust and Victoria blight, has been released (cf. Abst. 255).

Maize. The DS and NEH hybrids from the New England Tableland, New South Wales, are normally quicker-maturing than any of the Queensland hybrids, are deficient in husk-covering and have proved highly susceptible to yellow stripe disease and wet conditions in the Atherton Tableland.

Sorghum. Seven of the 14 hybrid selections tested outyielded Wheatland, the highest yield being given by a Day Milo x Dwarf Kalo hybrid. An attempt is being made to cross Martin grain sorghum with Atlas sweet sorghum with the aim of producing a dwarf grain sorghum with sweet palatable stalk and leaf. Alpha has consistently done well at Hermitage.

Sudan grass. Selection for low prussic acid content combined with high yield and palatability is being continued. An American introduction, Tift, has proved superior to Roma and Sweet Sudan in yield and freedom from leaf blight and other leaf diseases.

Cotton. Coker 100 again showed its superiority in yield over all other varieties tested. The possibility of improving its lint characters by crossing it with a coarse-fibred cotton such as Miller is being considered.

Tomato. Some promising new types are: Strain 147, a nematode-resistant selection; Southland, a *Fusarium*-resistant introduction from the USA; a CSIRO selection from Valiant, suited to Central Queensland; and some selections from Q3 x Bowen.

Beans. Breeding for rust resistance in French beans has commenced. Californian Small White navy bean has proved highly resistant to rust race 17a, and the French beans Florida Belle and Landreth show some resistance.

Cowpea. Giant, Chinese Red and the recent introduction Blackeye 5 have shown good resistance to stem rot. The last-named variety, however, does not yield well, and is to be crossed with Soutter in an attempt to produce a more productive resistant variety.

1773 Smith, H. C.
Annual Report of the Department of Agriculture, Tasmania, for 1953-54 (1954) : Pp. 43.

Wheat. The development of a stem-rust resistant and high-yielding wheat suitable for biscuit manufacture is receiving attention. In preliminary tests, 21 hybrid selections showed a higher baking quality than standard Tasmanian varieties; in yield they equalled or exceeded the control.

Potato. Breeding to introduce resistance to late blight and viruses into a Brownell type continued. Study of the inheritance of reaction to viruses has been initiated.

Tomato. Hybrid vigour in crosses between pure lines of Vetomold is being investigated.

Other crops. Selection of hops, small fruits and vegetables is mentioned.

1774 Nijdam, F. E.
The variety in its diversity.
Euphytica, Wageningen 1954 : **3** : 181–87.

The term variety is discussed with reference to (1) its botanical definition, (2) its application to vegetatively reproduced crops, to self-pollinated and cross-pollinated plants and to commercial hybrids and (3) the problem of granting breeder's rights.

1775 Pesola, V. A.
Agronomi Väinö Mikkola, lajikemiehenä ja kasvinjalostajana. (**The agronomist Väinö Mikkola, an originator of new varieties and a plant breeder**).
Maatalous 1954 : **47** : p. 286.

In this review of the career of the late V. Mikkola, an account is given of his achievements in the field of plant breeding, particularly with reference to cereal crops, pulses and potatoes.

1776 Nilsson, O.
Hammenhögs vid 30 år. (**Hammenhög after 30 years**).
Våren 1955. Hammenhögs, Otto J. Olson & Sons AB 1–7.

The achievements of the Swedish firm of Otto J. Olson & Sons of Hammenhög in plant breeding and the production of seed of new varieties and strains of crop plants are briefly recorded, with a list of the varieties of forage grasses and legumes, roots, potatoes, rape and field peas put on the Swedish market from the Gullåker Plant Breeding Institute during 1950–55.

1777 **Experimental Farms Service.**
Canad. Dep. Agric. 1954 : Pp. 68.

This booklet presents an account of the organization and functions of the Experimental Farms Service of the Department of Agriculture of Canada; it also gives climatological data for the different stations. Variety testing and breeding of agricultural and horticultural crops are among the activities outlined.

1778 Weibull, G.
On plant-breeders' rights.
Agri hort. genet., Landskrona 1954 : **12** : 211–23.

Proposals for recompensing the breeder for his outlay in developing new varieties are put forward and the various systems evolved to this end in different European countries are outlined.

1779 Harland, S. C.
Plant breeding and genetics.
Emp. Cott. Gr. Rev. 1955 : **32** : 12–23; also Advanc. Sci. 1955 : **11** : 383–86.

The text is given of a contribution to the symposium Genetics and the advancement of science, held during the meeting of the British Association, Oxford, September 1954. The genetical implications of selection in empirical breeding for associations of characters not possessed by the wild types are discussed, mainly in terms of the so-called vitality, reproductive and antimutability complexes of a species. It is postulated that domestication leads to genetical erosion with respect to these and other complexes; the significance of this hypothesis is discussed in relation to breeding policy. The influence of different breeding systems on methodology is briefly considered. In this connexion it is pointed out that material from different parts of the geographical range of a species may show wide variation in the degree of inbreeding depression and consequently in the appropriateness of the inbred material for the commercial exploitation of hybrid vigour. For example, inbreeding of local maize of Trinidad has frequently been accompanied by hardly any depression in vigour for four generations, by which time uniformity has been established at a high level of vigour. The common practice of sowing small patches of ground with seed from a single selected ear in the West Indies has gradually led, it is suggested, to a predominantly homozygous genetic system now suffering from little, if any, inbreeding depression. In conclusion, it is stressed that plant breeding is evolving into a "new science of genetical engineering."

1780 Elagin, I. N.
(**The production of hybrid seed**).
Nauka i Žiznj (Science & Life), Moskva 1954 : No. 7 : 11–12. [Russian].

The sunflower hybrid Ždanov 8281 x(VNIIMK 6540 [Institute of Oil Industry 6540] + VNIIMK 1646) is described. It yields 2·9 c. more seed per ha. than Ždanov 8281 and its oil content is 4% higher. Brief mention is also made of the hybrid maize Partizanka [Partisan], derived from Sterling x Minnesota 23.

1781 van der Kley, F. K.
De betekenis van manlijke steriliteit voor de kweker van heterosiszaad. (**The importance of male sterility for the grower of hybrid seed**).
Meded. Dir. Tuinb. 1955 : **18** : 11–20.

The importance of heterosis in the commercial production of agricultural and horticultural crops is discussed, special mention being made of results achieved outside the Netherlands with tomato, onion, mangel and sugar beet hybrids by the use of male-sterile lines. The genetical basis of male sterility and the procedure to be followed in breeding single and double crosses in which male-sterile lines are involved are outlined and mention is made of the use in the USA of the monofactorial recessive system of inheritance of male sterility in artificially pollinated self-fertilizing crops such as the tomato.

1782 Dressler, R. L.
The Pre-Columbian cultivated plants of Mexico.
Bot. Mus. Leafl. Harv. 1953 : **16** : No. 6 : 115–73.

The centres of origin of some 80 pre-Columbian Mexican crop plants have been investigated along the lines suggested by N. I. Vavilov (cf. *PBA*, Vol. II, Abst. 210). Three centres of origin are recognized: (1) Mexico-Central American, 71 species; (2) Andes, 6 species; and Brazil-Paraguay, 3 species; the centre of origin of 8 species could not be determined. Four subordinate centres are recognized within the Mexican-Central American area, namely: Northern Mexico and the adjacent USA; Central Mexico; Southern Mexico and northern Central America; and the Guatemalan highlands.

1783 RAMANATHAN, K.
Chromosome numbers in Indian desert plants.
Curr. Sci. 1955 : **24** : p. 17.

The following numbers are reported: *Cassia sophera* var. *purpurea*, $2n = 24$; *Crotalaria burjia*, $2n = 16$; *Indigofera trigonelloides*, *I. cordifolia*, *I. argentea*, *I. enneaphylla* and *I. retroflexa*, $2n = 16$; and *Tephrosia purpurea* vars. *pumila* and *maxima*, $n = 12$.

1784 QUADT, F.
Möglichkeiten und Grenzen der Polyploidie-Züchtung. (**Possibilities and limits in using polyploidy in breeding**).
Festschrift zum 25 jährigen Bestehen des gärtnerischen Hochschulstudiums in Deutschland. (**Number commemorating the 25th anniversary of the establishment of the study of horticulture in German universities**).
Bund Diplomgärtn.; Abteil. Gartenb. Fak. Landb. Univ. Berlin-Charlottenburg 1954/55 : 145–52.

After some introductory remarks concerning the nature of the cell and the chromosome, the author goes on to discuss the natural occurrence of polyploid forms in some plant species and the doubling of the chromosome complement by colchicine treatment. It is argued that, although many artificially induced polyploids may be retarded in their growth and vigour through having giant cells, this is amply compensated by the frequent occurrence of gene recombination and mutation in such plants, and that in this way new, higher-yielding strains may be obtained. Allopolyploids are considered to offer better possibilities in this respect than autopolyploids.

1785 NYGREN, A.
Apomixis in the angiosperms. II.
Bot. Rev. 1954 : **20** : 577–649.

Literature on the occurrence of apomixis in a large number of economic and noneconomic genera is surveyed. Only those papers not mentioned by Gustafsson in his survey (cf. *PBA*, Vol. XVII, Abst. 1100; Vol. XVIII, Abst. 104 and Vol. XX, Abst. 114) or published after this work appeared are considered.

1786 BADENHUIZEN, N. P.
The growth of starch grains in relation to genotype and environment.
S. Afr. J. Sci. 1954 : **51** : 41–47.

The dependence of the shape, chemical composition and molecular structure of starch grains upon both the genotype and external conditions is discussed with reference to maize and other crops. Surveying information on the structure and function of the cytoplasm in relation to the chemistry and development of starch grains, the author stresses the inadequacy of present knowledge and indicates some of the problems requiring investigation.

1787 MANSFELD, R.
Zur allgemeinen Systematik der Kulturpflanzen II. (**On the general systematics of crop plants II**).
Kulturpflanze, Berlin 1954 : **2** : 130–42.

Current methods of classifying species and varieties of crop plants according to their morphological and physiological characters are discussed in general terms, special reference being made to the Russian system of placing prefixes before the specific name when it is desired to subdivide the group according to morphological characters. The application of the terms specioid, subspecioid, convar, provar, nidus and cultivar (cf. *PBA*, Vol. XXIV, Abst. 2779) is also treated and, in this connexion, difficulties arising from the great diversity of forms in cultivated plants as the result of artificial selection are mentioned.

1788 SCHELL, H.
Bedeutung von Saatgutwechsel und Sortenwahl für den mittel- und kleinbäuerlichen Betrieb. (**Importance of seed change and choice of varieties for medium-sized and small farming concerns**).
Arch. dtsch. LandwGes. 1954 : **14** : 77–89.

Data are presented on yield increases obtained with cereals and root crops in Germany over the past 75 years and an account is given of the gradual replacement of land races by pedigree varieties. It is urged that this process be accelerated and factors, such as soil and climatic conditions, to be taken into account by the farmer when deciding which variety to grow are outlined.

1789 BINGEFORS, S.
Resistens mot nematoder hos våra kulturväxter. (**Resistance to nematodes in our crop plants**).
Svensk JordbrForsk. Årsb. 1954 : 174–80.

The difficulties encountered in endeavours to obtain eelworm-resistant varieties of various crop plants are outlined with particular reference to Swedish needs. In Sweden, as in Denmark, considerable success has been attained in breeding stem-eelworm resistant red clovers and the problem of combining such resistance with winter hardiness is also well on the way to solution. Similar research is proceeding on lucerne.

A general cause of plant resistance appears to be inhibition of reproduction of the nematode and this may be due to the effect of starvation on the development of the parasite.

Other types of resistance, e.g. where the nematode is prevented from penetrating the plant tissues, should be studied in collaboration with the biochemist.

1790 PAINTER, R. H.
Some ecological aspects of the resistance of crop plants to insects.
J. econ. Ent. 1954 : **47** : 1036–40.

After a brief survey of some examples of disease control in the United States and Canada by means of resistant varieties, the author analyses the nature of resistance and discusses the effect of physical, biotic and edaphic factors upon the expression of genes for insect resistance, with reference chiefly to wheat. In some circumstances ecological conditions unfavourable to the insect concerned may increase the value of the resistance of a crop variety beyond that predicted from cage and nursery tests. Ecological conditions adverse for the development of Hessian fly have, for example, increased the value of the resistant wheat Pawnee as a means of reducing the population of this fly in central Kansas.

1791 **Meeting of the Assinsel Board in Paris, December, 1954** : Pp. 12. (Mimeographed).

The aims of the International Association of Professional Plant Breeders for the Safeguarding of Breeding Achievements have been outlined in previous abstracts (cf. *PBA*, Vol. XXIV, Absts. 955 and 1755). At a meeting of the Executive Committee in Paris on 11 December, 1954, it was suggested that each member country institute a register of patented varieties and that measures be undertaken to ensure that the inscription of any variety in this register gave the breeder concerned the right to royalties, irrespective of whether the variety were grown in its country of origin or abroad. To this end, the creation of an ASSINSEL Charter is proposed. Such a charter would depend for its smooth operation on legal measures or, in countries in which these could not be secured, on the professional good-will and integrity of seed-producers.

CEREALS

1792 LEWICKI, S.
Prace Zakładu Hodowli Zbóż w Puławach. **(The work of the Grain Culture Station in Puławy).**
Roczn. Nauk rol. 1954 : **69** : Ser. A : 307–09.

Work on buckwheat has indicated the possibility of obtaining varieties with a tendency to self pollination and with increased resistance to cold. The favourable effect of vernalization on yields of barley, oats and spring wheat was confirmed. Mention is made of the transformation of three winter wheat varieties into spring varieties.

A suitable hard wheat is being introduced into cultivation for the first time in Poland and, also, a high yielding millet variety. The characteristics of branched wheat are being studied.

1793 **Seed bulletin. Cereals.**
IVRO, Wageningen 1954 : Pp. 16.

Descriptions of the main varieties of winter and spring wheat, oats and barley recommended for cultivation in the Netherlands in 1954 are given (cf. *PBA*, Vol. XXIV, Absts. 1886, 1898 and 2008).

1794 MORRIS, G. P.
Descriptions of wheat, barley and oat varieties.
J. nat. Inst. agric. Bot. 1954 : **7** : 33–43.

The following varieties have been provisionally recommended by the National Institute of Agricultural Botany:—

Wheat. Masterpiece (Holdfast x Squarehead's Master) is slightly higher-yielding and more resistant to mildew than Squarehead's Master 13/4, with grain of good milling and high baking quality. The Belgian variety Ministre [Minister] is later and generally higher-yielding than Bersee, with shorter, stronger straw and high resistance to yellow rust. The Swedish variety Atson (Marquis x Hâtif Inversable) is stiff-strawed and similar to but higher-yielding, earlier and longer-strawed than Atle.

Oats. Opus, a Danish selection from Standt, is later than but otherwise similar to Sun II. The straw is short and resistant to lodging.

Barley. The three varieties Carlsberg (Maja x Prentice), Herta (Kenia x Isaria) and Rika (Kenia x Isaria) have been previously described (cf. *PBA*, Vol. XIX, Abst. 1791 and *PBA*, Vol. XXII, Abst. 1907 and Abst. 2707).

JURJEV, V. JA. [Editor]
(Breeding and seed production of grain crops).
Gosudarstvenn. Izdat. Seljskohozjaĭstv. Lit., Moskva, 1953 : Pp. 222.

This volume, comprising the collected works of the Harjkov State Breeding Station for 1946–50, contains the following articles:—

1795 *Pahomova, V. P.* (*The winter rye Harjkovskaja 194*). (*pp. 5–16*).

The variety described was selected from Petkus 950 by selection for cold resistance. Further improvements were effected by intercrossing different lots of material grown under different ecological or cultural conditions. Seed obtained by crossing between adjacent plots receiving different manurial dressings produced plants that yielded 23·5 c. per ha. compared with 22·2 c. from uncrossed seed. Careful selection of the best progenies continues during the course of seed production; supplementary pollination is also used and results in a yield increase of 1·2–1·3%. The variety now outyields all other rye varieties in the Harjkov province, this superiority being more pronounced today than at the time it was first introduced. It is being grown more and more extensively also in other provinces in the Ukraine, where it has excelled well-known varieties such as Lisicyn's rye.

1796 *Didusj, V. I.* (*New varieties of winter wheat*). (*pp. 17–28*).

The following varieties have been produced since 1940 by the Harjkov plant breeding station.

Lutescens 266 is an awnless wheat from a cross of Ukrainka x Jurjevka (= Albidum 676, a selection from Sandomirka). The best selections from the cross were pooled and subjected to mass selection, followed again by individual selection, the plants being grown under optimum cultural conditions. Lutescens 266 has given a yield of 35 c. per ha. over a seven-year period, this being 11% higher than Ukrainka; it has also excelled other standard varieties in yield, freedom from Hessian fly and tolerance of drought; it is moderately hardy, stands well and is quite free from loose and covered smut; its grain is of high quality.

Milturum 13 is an awnless wheat produced by crossing two cold-resistant varieties, Ferrugineum 1239 and Lutescens 121; it is very hardy, midearly, very strong in the straw, fully resistant to loose smut and fairly resistant to covered smut and brown rust. Its quality is good and it has exceeded the standard varieties in yield.

Zenitka was produced by intravarietal crossing in the variety Hostianum 237; it is 5–8 cm. shorter in the straw than the parent variety, which it surpasses in yield, strength of straw, smut resistance and baking quality; under favourable conditions it has yielded up to 42 c. of grain per ha.

Lutescens 238 was produced by individual plant selection from Lutescens 17, which it exceeds in winter hardiness and yielding capacity, being equal to it in resistance to brown rust and drought.

1797 *Golub, M. A.* (*Intervarietal crosses of winter wheat*). (*pp. 29–36*).

Under the conditions of Harjkov natural cross pollination in wheat is quite common and examination of several varietal populations revealed the presence of 9–10% of hybrid plants, which were more vigorous than the uncrossed plants of the same population. Yield increases of 1·5–2 c. per ha. were obtained also by intravarietal crossing. Seed of Hostianum 237 and Ukrainka produced in this way was sown in plots surrounded by 12 of the best wheats of the Harjkov area; their ears were emasculated and left to open pollination. The seed from these plants gave rise to seedlings which differed from those from uncrossed seed by greater tillering capacity and hardiness and in Hostianum 237 in strength of straw; they yielded 13–18% more grain on an average in three successive years; the increase in Hostianum 237 resulted mainly from larger grains, in Ukrainka from a larger number of grains per ear. The second generation from the crossed seed gave a yield increase of 9% and the third generation was in some years slightly higher, in some equal and in others slightly lower in yield. The number of plants deviating in botanical characters varied in the hybrid populations from 25 to 44%; by selecting the plants resembling the maternal type a uniform population was produced which in Hostianum 237 was equal to the mixed population in yield but in Ukrainka was 5% less.

1798 *Kučumov, P. V.* (*New varieties of spring wheat*). (*pp. 37–47*).

The variety Narodnaja [People's] was produced by growing plants of a local population of spring wheat in the Harjkov district under different conditions of manuring, allowing them to interpollinate and subjecting the resulting population to mass selection; intravarietal crossing was performed periodically on the selections; the variety is a smooth-awned form of *Triticum durum* var. *hordeiforme*; in yield it has exceeded the local standard Melanopus 69 in the Harjkov province and the corresponding standards in a number of adjacent provinces; it is superior also in baking quality and is resistant to smuts and brown rust.

Otečestvennaja [Fatherland] is a variety of *T. vulgare* produced by crossing Erythrospermum 459 and Milturum 162 and infecting the progeny artificially with smut spores; it is awnless, highly resistant to loose and covered smuts, and equal to Lutescens 62 in yield and quality.

1799 *Kučumov, P. V.* (*Breeding work for the production of a large-eared spring variety of hard wheat*). (*pp. 48–57*).

Large-eared forms of *Triticum turgidum* were crossed with *T. dicoccum*. The reciprocal cross inherited the brittle ear and other undesirable characters of *T. dicoccum* and was discarded but from the direct cross some promising hybrids characterized by large ears were selected; one of them, Hordeiforme 34–5129, was superior to Melanopus 69 and Narodnaja [People's] in drought resistance and yield; it was crossed with other tetraploid wheat varieties to improve its resistance to loose smut and earliness.

1800 *Kučumov, P. V.* (*Using the large fraction of seeds of cereals for increasing yield*). (*pp. 58–66*).

By separating the largest fraction during seed cleaning operations and sowing it, a yield increase of 8% was obtained in the resulting plants in spring wheat, 4–5% in winter wheat, 7·4% in barley and 10·7% in oats. In many cases the increased yield persisted in the following generation. The differences were usually more pronounced in years of drought than in favourable years.

1801 *Dmitrieva, G. I.* (*Breeding naked barley*). (*pp. 67–78*).

Varieties of naked barley with shorter vegetation periods have been produced by crossing parents chosen according to the theory of phasic development. Thus varieties 44–391 and 44–423 ripen 5 days before the standard variety Jubileĭnyĭ [Jubilee] and are only 4·7–9·3% inferior to the hulled varieties in grain yield, in which 7% of the grain weight is comprised of husk. They are not attacked by loose and covered smuts. Variety 39–181 arose from a cross of Europaeum 353/133 with a naked barley 534 and with a yield of 21·8 c. per ha. in 1949 and 1950 was 9·9% below Jubileĭnyĭ, which has a husk percentage of 9%; its grains are equal to Jubileĭnyĭ in size and have a protein content of 17·8–18·1%; it is somewhat more susceptible to covered smut than the hulled varieties.

Applying the principle of crossing forms of different geographical origin, an Abyssinian naked barley of var. *neogenes* was crossed with 353/133, a western European ecotype, giving a wide range of types in the progeny; from this and other similar crosses several naked barleys have been produced and are now undergoing trials.

The smooth-awned variety 46 of the Lysenko Breeding and Genetics Institute has been crossed with the naked variety 25–5, giving rise to some high-yielding, smooth-awned naked barleys which have yielded up to 13·4% more grain than Jubileĭnyĭ, or 24% more when the husk is discounted. One of them, Golozernyĭ 1 [Naked 1] is being multiplied. Others have been used as parents in further crosses, from which several early-ripening naked forms with fairly tall strong straw and large grains have been produced.

The method of open pollination with selective fertilization is also being used in making crosses.

1802 *Ščelokova, Ė. I.* (*Intervarietal hybrids of maize*). (*pp. 79–90*).

Hybrids that have outyielded the standard maize varieties of the Harjkov province include Harjkovskaja 23 x Harjkovskaja Kremnistaja [Harjkov Flint], Belaja Zubovidnaja [White Dent] x Harjkovskaja Kremnistaja and Sterling x North Dakota by 22–26%. Belaja Zubovidnaja x North Dakota yields well and has white grain. The hybrids were distinguished by greater vigour of growth in the early stages and were usually taller than either of their parents. Differences between reciprocal hybrids were observed in respect of yield and morphological characters, the hybrids tending to show greater resemblance to the seed parent than to the pollen parent. Belaja Zubovidnaja Harjkovskaja [Harjkov White Dent] and Harjkovskaja 23 proved the best seed parents and Harjkovskaja Kremnistaja, North Dakota and Voronežskaja 76 the best pollen parents. The best hybrids were obtained when at least one of the two parents was a local standard variety and the two parental varieties differed as widely as possible in botanical characters. A fall in yield generally occurred in the second and later generations, though it was reduced somewhat when seed was taken from the best selected ears. By allowing the parent plants to interpollinate without detasseling, a hybrid was produced which yielded 2·1% less than the hybrids produced in the normal way. The yield of most hybrids was increased if the parents were grown under very different cultural or environmental conditions, the best results often being given when the seed parent was grown in more southerly regions. Pollinations with mixed pollen from a number of varieties showed that some varieties tended to select their own pollen while others selected pollen of certain particular varieties and rejected that of others. Owing to multiple fertilization of the embryo sac it often happened that the egg cell was fertilized by one variety and the polar nuclei, giving rise to the endosperm, by another variety, in consequence of which white seeds might give rise to a progeny which segregated for colour genes.

1803 *Černjavskaja, Z. S.* (*Breeding millet*). (*pp. 91–99*).

The variety Harjkovskoe 740, produced by individual plant selection from Veselopodoljanskoe 367 [Veselyĭ Podol 367], has given up to 10·5% more grain than the standard Harjkovskoe 436, the grain being larger, lower in husk percentage and higher in oil content.

A number of the best varieties were sown together in alternating rows and allowed to interpollinate, some of the flowers being emasculated. The progenies of a number of natural hybrids have also been subjected to selection; some of the selections have tall strong straw, large panicles free from shedding and yield from 4·75 to 12·95% more grain than the standard varieties.

1804 *Černjavskaja, Z. S.* (*A* Setaria-*like millet*). (*pp. 100–105*).

A plant with compact panicle resembling *Setaria italica* was found in a field of common millet and is described. Its progeny segregated in grain colour and the new form is ascribed to hybridization. Its grain yield was 2·5 c. per ha. above the standard in the first year but fell sharply in the following year; the protein content of the grain was 4-5% higher than that of other millets.

1805 *Fridentalj, S. M.* (*Production of high-yielding varieties of peas*). (*pp. 106–114*).

Observations on a number of varieties showed that they varied in the number of seeds per pod, late varieties with small seeds having the largest number and the highest yield. These and fasciated varieties have been widely used in hybridization at Harjkov with the object of increasing yielding capacity. From these crosses varieties have been produced which bear their pods in pairs. The best of the new hybrid varieties, Harjkovskiĭ 131, yielded 40·5 c. of seed per ha. in 1949 as compared with 19·5 c. from Mahndorf Victoria. The peas are smaller, better in cooking quality and higher in protein content; the plants are less seriously attacked by *Bruchus pisi* and are highly resistant to *Ascochyta* but suffer somewhat more from aphid and virus attacks; they ripen 30–35 days later than Mahndorf Victoria.

1806 *Fridentalj, S. M.* (*Floral biology and natural crossing in* Phaseolus). (*pp. 115–19*).

Although *Ph. vulgaris* is normally self pollinated, a number of natural hybrids are found every year at the breeding station at Harjkov; even hybrids with *Ph. multiflorus* have occurred. Some of the hybrids have been selected and have given rise to new varieties, several of which are undergoing trial.

1807 *Voljf, V. G.* (*Vegetative hybridization and its utilization in sunflower breeding*). (*pp. 120–39*).

The methods used in making the grafts are described. Grafts between different varieties showed various alterations in characters such as husk percentage and oil content and seed-coat colour. The first seed generation from the grafted plants contained a number of plants deviating from the parental type, their proportion varying in different parental combinations. Some progenies flowered earlier than either parent, some later. Resistance to broomrape varied according to the susceptibility of the parents but in most progenies resistance was somewhat higher than in the corresponding ungrafted controls. Husk percentage and oil content in some progenies, though not in all, varied in accordance with that of the parental components.

Several families distinguished by high yield, low husk and high oil percentage have been selected from the progenies of the grafts.

1808 *Kučerjavaja, M. I.* (*The latest in estimating drought resistance*). (*pp. 140–53*).

The water content of the leaves was determined at regular intervals throughout the growing season in an experimental collection of 10 varieties of winter rye and 20 of winter wheat, but the variations were found to have no relation to the drought resistance of the varieties. At the time when the grain was beginning to ripen however the leaves of the more drought-resistant varieties were mostly brown and withered, whereas in the less resistant they were often quite green. It was further found that removal of the leaves at that stage caused a reduction in yield of only 1–8% in resistant winter wheats, 10–16% in varieties of intermediate resistance and 25–35 and even up to 40% in susceptible varieties. Similar results were obtained with spring wheats and barleys.

When dried at a temperature of 80° or 100° C., the grains of drought-resistant varieties were less reduced in germinating percentage than those of susceptible varieties; the seedlings from the treated grain were depressed in growth in the susceptible varieties whereas in the resistant they were equal to the untreated or sometimes surpassed them in vigour. Some of these plants were selected and their progeny also displayed greater vigour and bore larger leaves and ears.

1809 *Meljnikov, N. I. & Pavlovskaja, E. G.* (*Dependence of baking quality on the carbohydrates of the flour in wheat varieties*). (*pp. 154–62*).

The carbohydrate fraction was removed from the flour of a number of different varieties by centrifuging and analysed. The flour of *Triticum durum* varieties had a higher content of amylodextrins than that of the bread wheats. The quality of the bread produced was found to be influenced by the carbohydrates as well as the protein of the flour.

1810 *Borisenko, S. I.* [*Artificial infection of barley with leaf stripe* (Helminthosporium gramineum *Rabh.*)]. (*pp. 169–78*).

A method is described in which the air is removed from the ears by vacuum treatment, after which a suspension of spores in water is introduced. For larger quantities of material soil infection is carried out using either infected leaves or an artificially cultured mycelium, the former being sown together with the seeds, the latter applied to hulled seeds before sowing.

1811 *Zagarova, A. V. & Lukjjanenko, E. M.* (*Breeding barley and spring wheat for resistance to frit fly*). (*pp. 179–91*).

Studies of the races of the frit fly in the Ukraine showed *Oscinella frit* var. *pusilla* to be the predominant race on barley and on spring varieties of bread wheat. Eggs were laid in greater quantities on spring wheat varieties having a low degree of pubescence than on pubescent varieties; in barley no morphological difference could be detected between varieties differing in susceptibility. Both in barley and spring wheat, varieties which form a small number of vigorous tillers proved to be more resistant than varieties with a high tillering capacity. Examination of the world barley collection of the Institute of Plant Industry showed only 1·5% of them to be resistant; from these, 13 lines have been selected for use as parents. Several local varieties displayed a certain degree of resistance too. Variety 38–306, a selection from a barley in the world collection, is specially mentioned as being resistant, forming a small number of strong tillers, and ripening almost as early as Jubileĭnyĭ, which it exceeded in yield by 2·8 c. per ha. in 1948–50; it has been named Harjkov 306.

Among the wheats, a few resistant forms were found in the world collection. Certain progenies from *Triticum turgidum* x *T. dicoccum* and their crosses with Melanopus 69 displayed a high degree of resistance.

1812 *Zagovora, A. V.* (*Methods of assessing varieties of wheat and barley for resistance to frit fly*). (*pp. 192–99*).

Varieties of barley and spring wheat are tested by sowing in the midst of winter wheat and only those which come through relatively free from attack are subjected to detailed tests of their reaction to the spring generation of flies.

1813 *Zagovora, A. V.* (*Damage caused by insects in grass species in herbage mixtures*). (*pp. 200–13*).

Information is given on the degree to which different species are attacked by frit fly, Hessian fly and stem flea-beetle.

1814 *Zagovora, A. V.* (*The possibility of using Hexachlorane for presowing treatment of seed and application to the soil*). (*pp. 214–23*).

Crop species, and even varieties, differ in their susceptibility to the effects of Hexachlorane when used as a seed dressing.

1815 MacKey, J.
Some reflections on Canadian and Swedish breeding of cereals.
Cereal News 1955 : **2** : 3–4.

The differences in aims and methods of cereal breeding in Canada and Sweden are briefly described. In the former country, where disease resistance, usually regulated by one or a few genes, is the main objective, back-crossing and the pedigree method are the most common breeding procedures and small yield plots in many replications are used in trials; in Sweden, where breeding is chiefly concerned with yield, frost resistance and other characters controlled by multiple factors, the bulk method is preferred, with trials conducted on large plots at few stations.

1816 Miyashita, Y.
(**On the sensitivity of spring cereals to temperature and illumination in Hokkaido**).
Hokkaido Nogyo Shikenjo Iho/Res. Bull. Hokkaido agric. Exp. Sta. 1954 : No. 66 : 70–74. [Japanese].

Data on heading period and the number of leaves on the main stem are provided for 8 spring wheat varieties, 2 winter wheats, 4 hulled barleys and 2 naked barleys grown under various conditions of temperature and photoperiod in a greenhouse. Varietal differences in the ways in which the two characters studied were affected by temperature and photoperiod are noted. In most cases, high temperature and long photoperiods (15 hr.) effected a reduction in vegetative period, but the effect of temperature was only slight in such wheat varieties as Norin 3 [Ministry of Agriculture and Forests 3] and in the barleys.

1817 DEATHERAGE, W. L., MACMASTERS, M. M. & RIST, C. E.
A partial survey of amylose content in starch from domestic and foreign varieties of corn, wheat, and sorghum and from some other starch-bearing plants.
Trans. Amer. Ass. Cereal Chem. 1955 : **13** : 31–42.

Tables are presented showing the amylose content of starch from numerous maize, wheat and sorghum varieties of American and other origin; similar data on a number of leguminous and other plants are included.

1818 HIGASHI, S., SAMOTO, K. & KAGOHASHI, S.
(**The poor development of cereal roots on acid soils and intervarietal differences in this respect**).
Tokai Kinki Nogyo Shikenjo Kenkyu Hokoku/Bull. Div. Pl. Breed. Cult. Tokai-Kinki agric. Exp. Sta. 1954 : No. 1 : 151–55. [Japanese].

The root development of 6 wheat varieties and 8 barleys was investigated when these were grown on soils of pH 4·5. Varietal differences in the degree of inhibition of root development were noted in both crops, the barleys being the more seriously affected.

1819 STRAND, E.
Undersøkelser over kornarters og kornsorters værresistens. (**Studies of the weather resistance of cereal species and varieties**).
Forskn. Fors. Landbr. 1954 : **5** : 547–78.

The results of Norwegian investigations into the effects of delay in harvesting on the quantity and quality of the yields of 21 varieties of spring wheat, 32 of barley and 20 of oats are reported. Among the spring wheats, losses of grain due to premature sprouting under adverse weather conditions were lowest in the late varieties Svenno, Drott [King] and Diamant II [Diamond II] and in the early varieties Tammi and Kimmo. Herta was the most weather-resistant two-rowed barley, while smooth-awned six-rowed barley was superior to rough-awned. Varietal differences between oats were not significant.

1820 AUFHAMMER, G.
Über Methoden zur Bestimmung der Kälteresistenz und Winterfestigkeit. (**On methods of determining cold resistance and winter hardiness**).
Z. Pflanzenz. 1954 : **34** : 85–96.

Methods of testing cereal varieties for winter hardiness and resistance to cold, either in the open or under laboratory conditions, are discussed. In most, but not all, varieties a positive correlation was established between winter hardiness and prostrate growth-habit.

1821 ANMA [AMMA], M. & ODA, K.
(**Studies on postharvest cereal cultivation in rice fields in the Kanto region. IV. Specific and varietal differences in the germination of cereal grains under excessively moist conditions**).
Kanto Tosan Nogyo Shikenjo Kenkyu Hokoku/J. Kanto-Tosan agric. Exp. Sta. 1952 : No. 3 : 23–28. [Japanese].

The ability of wheat, common barley and naked barley varieties to grow under the wet conditions of rice fields was found to be correlated with the capacity of the grain to germinate in Petri dishes or on soil after soaking in water for various periods. Varietal differences in resistance to excessive moisture were noted for each crop, and most particularly for wheat.

1822 IKEDA, T., HIGASHI, S., KAWAIDE, T. & SAIGO, S.
(**Studies on the resistance of cereal varieties to excessive moisture. I. Studies on methods of testing the resistance of cereal varieties to excessive moisture**).
Tokai Kinki Nogyo Shikenjo Kenkyu Hokoku/Bull. Div. Pl. Breed. Cult. Tokai-Kinki agric. Exp. Sta. 1954 : No. 1 : 21–26. [Japanese].

Wheat and barley, when grown on drained rice fields, frequently suffer from excessive soil moisture; two techniques for testing varietal differences in this connexion were therefore devised, one involving growth of the varieties on artificial ridges under field conditions, the other based on observations of the degree of yellowing of the leaves of varieties grown in water-logged soil in pots. Varietal differences in resistance to excessive moisture were noted both for wheat and barley, the differences being more marked in the case of wheat.

1823 Higashi, S. & Kato, T.
(**Studies on the resistance of cereal varieties to *Gibberella saubinetii*. II. Intervarietal differences to *G. saubinetii* at the initial stage of infection**).
Tokai Kinki Nogyo Shikenjo Kenkyu Hokoku/Bull. Div. Pl. Breed. Cult. Tokai-Kinki agric. Exp. Sta. 1954 : No. 1 : 90–95. [Japanese].

The incidence of initial spikelet infection in 38 wheat and 43 barley varieties was investigated. In both species, initial infection was correlated with the frequency with which the withered anthers were retained by the spikelet after pollination. In the case of wheat, initial infection was also correlated with the intensity of chlorophyll pigmentation along the long axis of the glume.

1824 Johnson, T.
International co-operation in the production of rust resistant cereals.
Commonw. Phytopath. New 1955 : **1** : 5–7.

A brief account is given of cooperation among countries in the British Commonwealth and the Americas, with respect to the exchange of breeding material, testing, investigations on rust races and other activities connected with breeding rust-resistant cereal varieties.

1825 Hansen, L. R.
Valg av kornart og kornsort 1955. (**Choice of cereal type and variety for 1955**).
Samvirke 1955 : **50** : 147–50.

Data on yield of grain and straw, susceptibility to lodging, percentage of husk and number of days to maturity are presented for varieties of wheat, oats and barley tested at several centres in Norway from 1950 to 1954.

1826 **Cereal news from Canada.**
Cereal News 1955 : **2** : 11–18.

The results of regional varietal trials of wheat, oats and barley are briefly commented upon. The complex hybrid spring wheat 4280–10 outyielded Cascade and Selkirk at Normandin, Quebec. Garry proved the highest-yielding oat variety in Ontario. At 14 stations in Eastern Canada the mildew-resistant fodder barley Brant was superior in yield to all other named varieties, and Gateway has shown promise in Alberta.

WHEAT

1827 Aufhammer, G.
Zur Sortenfrage bei Sommerweizen. (**On the varietal question in spring wheat**).
Mitt. dtsch. LandwGes. 1955 : **70** : 167–69.

Data on yield, baking quality, length and stiffness of straw, colour and shape of ear and grain and resistance to diseases and insect pests are presented for the main varieties of spring wheat cultivated in Western Germany. In Schleswig-Holstein and Lower Saxony, the principal areas in which spring wheat is grown, such varieties as Breustedts Teutonen, Heines Peko, Rimpaus Langensteiner and Hohenheimer Franken frequently outyield winter wheats and have, in addition, the advantage that they are not normally subjected to the danger of frost.

1828 Gadea, M.
Trigos Españoles. (**Spanish wheats**).
Inst. Nac. Invest. agron., Madrid 1954 : Pp. xv + 450 : figs. : plates.

This monograph on the Spanish wheats begins with an outline of the characters used in classification and of the taxonomy of the genus *Triticum*; there follow keys for the determination of the varieties comprising the collection of Spanish wheats maintained by the Instituto Nacional de Investigaciones Agronómicas [National Institute for Agricultural Research] at Madrid, with descriptions of each variety; some are also illustrated with photographic plates. The majority of the varieties belong to *T. vulgare* but there is a quite large section devoted to *T. durum*, in addition to which a few representatives of *T. turgidum*, *T. polonicum*, *T. dicoccum*, *T. monococcum* and *T. spelta* appear. There is a table indicating the distribution of the varieties according to region, and an alphabetical list of the varieties and a short bibliography complete the work.

1829 Wagner, S. & Popow, G.
Die wichtigsten Weizensorten des schweizerischen Richtsortimentes für den Getreidebau 1954. (**The most important wheat varieties in the Swiss approved variety collection for cereal cultivation, 1954**).
Flugbl. Landw. VersAnst. Zürich-Oerlikon 1954 : No. A/7 : Pp. 8.

Comprehensive data on pedigree, morphological characters, yield, grain quality and resistance to diseases and lodging are presented for the winter varieties Provus, Mont-Calme 245 and Mont-Calme 268 and for the spring varieties Huron and Lichti's Weihenstephaner früher Sommerweizen [Lichti's Weihenstephan early spring wheat].

1830 **World catalogue of genetic stocks. Wheat. Supplement No. 4.**
FAO UN, Rome 1954 : Pp. 17. (Mimeographed).

This supplement contains contributions from Australia, Cyprus, Egypt, Japan, Morocco and Tunisia (cf. *PBA*, Vol. XXIV, Abst. 991).

1831 RODGER, J. B. A. & THOMPSON, E. G.
Winter wheat variety trials, 1942-1947.
J. nat. Inst. agric. Bot. 1954 : **7** : 44–51.

Trials of nine varieties conducted at Cambridge and seven regional centres are reported. The early variety Bersée and the later variety Jubilegem gave the highest yields, the latter having shorter, stronger straw and the former less susceptibility than other varieties to yellow rust, mildew and loose smut.

1832 FIDDIAN, W. E. H.
Winter wheat variety trials (Bersee control) 1947-51.
J. nat. Inst. agric. Bot. 1954 : **7** : 52–63.

Data on fifty-two trials of 11 early varieties carried out at Cambridge and thirteen regional centres are presented. Nord Desprez, Petit Quin Quin [Little Quin Quin] and Hybrid 46 were higher-yielding, shorter-strawed and more resistant to lodging than Bersée.

1833 THOMPSON, E. G.
Winter wheat variety trials (Juliana control) 1946-51.
J. nat. Inst. agric. Bot. 1954 : **7** : 64–73.

Of 11 late varieties tested in 57 trials at 16 centres in England and Scotland, Alba, Eroica, King II and Pilot all gave higher yields than the control, while Staring, King II and Alba were shorter-strawed and stronger.

1834 TRENTIN, A.
Risultanze della sperimentazione sul grano condotta dall'Istituto di Genetica di Lonigo nell'annata 1953–54. (**Results of the experiments on wheat carried out by the Institute of Genetics at Lonigo in the year 1953-54**).
Agricoltura d. Venezie 1955 : **9** : 15–23.

The work covered by the report includes observations on old varieties, carried out at a number of centres in different parts of Italy, from which it is seen that Funo, Mara and S. Pastore have given good results at all centres in the Veneto; S. Pastore, Funo and Jacometti 49 have done well at most centres in Piedmont and Lombardy and Mara was outstanding also in Emilia. Among the newer varieties, Generoso [Generous], Campodoro, Fraschetta and Bormida receive favourable mention, together with R. Forlani and S. Marino.

1835 VALLE, O.
Svenno-kevätvehnä — uusi myöhäinen Weibullsholmin jaloste. (**Svenno spring wheat, a new late variety from Weibullsholm**).
Koetoim. ja Käytäntö 1954 : p. 13.

Variety trials in which the Swedish variety Svenno was compared with Timantti [Diamond] and Kärni [Kernel] at several experimental stations in Finland, are described. Svenno resists lodging even where fertilizers have been applied. Its yield in most localities falls between those of Timantti and Kärni, but it does better than the latter on acid soils and also ripens a few days earlier.

1836 KALLIO, V.
Kevätvehnän lajikekokeiden tuloksia Maatalouskoelaitoksen puutarhaosastolla v. 1946–1953. (**Results of spring wheat variety trials at the Horticultural Department of the Agricultural Experimental Station in the years 1946-1953**).
Koetoim. ja Käytäntö 1954 : p. 13.

A brief account of wheat variety trials is given with data for yield and earliness, using Timantti [Diamond] as the standard. Particulars of soil pH and fertilizers added are included. The Swedish variety Svenno gave the highest yield, being significantly superior to Kärni [Kernel], the next best variety.

1837 FAJERSSON, F.
Några nya rön om Svennovårvete. (**Some new experiences with the spring wheat Svenno**).
Weibulls ill. Årsb. 1955 : 26–27.

In recent trials in Sweden, this new early-maturing stiff-strawed variety (cf. *PBA*, Vol. XXIV, Abst. 194) outyielded all other spring wheats with which it was compared. It produces large well-filled ears and is resistant to mildew, rust, mould and *Fusarium* sp. Its 1000-grain weight is approximately the same as that of Kärn II [Kernel II], but its protein content is slightly higher. The baking quality of the grain is good.

1838 ÅKERMAN, Å.
Svalöfs vårvetesorter. (**Svalöf spring wheat varieties**).
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : 15–16.

The merits of the early-maturing varieties Drott [King], Fylgia II, Rival and Diamant II

[Diamond II] and the somewhat later-maturing varieties Ella and Progress are compared. In most localities Drott gives the highest yields but is excelled by Fylgia II in Gotland and by Kärn II [Kernel II] in Holland. Drott produces plump grains of good appearance and has moderately stiff straw.

1839 SIMLOTE, K. M.
A resume of studies on wheats in Malwa.
Indian J. agric. Sci. 1954 : **24** : 271–300.

The work carried out in Malwa, Madhya Bharat, during the period 1932–51 is reviewed. In addition to previously reported studies of the genetical variability and growth of local *durum* strains (cf. *PBA*, Vol. XX, Abst. 883 and Vol. XXIII, Abst. 1051, respectively), work on breeding and selection is described. As a result of crossing local *durum* and *vulgare* strains with rust-resistant material from Bombay and Madhya Pradesh, 50 progenies were obtained of which 16 contained 59 resistant and moderately resistant plants. In an investigation of the correlation of grain yield with other characters in Indian *durum* wheats, it was found that only tiller number and 100 grain weight were sufficiently reliable characters to serve as a basis for selection for high yield.

1840 **World lists of wheat breeders and breeding stations.**
FAO UN, Rome 1954 : Pp. 26. (Mimeographed).

Revisions are given of the 1953 lists of wheat breeders and breeding stations (cf. *PBA*, Vol. XXIV, Absts. 992–3).

1841 YAMASHITA, K. & OSBORNE, T. S.
One year's experimental wheat schedule at Pullman, Washington, U.S.A.
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **4** : No. 1 : 1–2.

A schedule of heat and lighting conditions requisite for raising two generations a year in a greenhouse at the above locality is given.

1842 Wheat Inform. Serv. Kyoto 1954 : No. 1 : Pp. 43.

The first issue of *Wheat Information Service* (cf. p. 459) includes an inventory of genetic stocks at the Laboratory of Genetics, Kyoto University, Japan. Information is given on the following stocks and investigations: Species and varieties of *Triticum*, *Aegilops* and *Agropyron*; progress in interspecific hybridization of *Aegilops*; X-ray induced mutants and reciprocal-translocation stocks of *T. monococcum* and *T. aegilopoides* and their linkage relationships; nullisomic dwarf strains and gigas genotypes in the progeny of *T. polonicum* x *T. spelta*; strains obtained by successive back crosses of *T. vulgare* x *Ae. caudata* with *T. vulgare* ♂; date of flowering of *Aegilops* spp.; spring and winter growth-habit of *Aegilops* and *Triticum* species and varieties; reaction of *Aegilops* and *Triticum* representatives to *Puccinia triticina;* autopolyploids of *Triticum*, amphidiploids of *Triticum* x *Aegilops* and autopolyploids and amphidiploids of *Aegilops*.

Other sections provide information on (1) general rules for the nomenclature and symbolization of genes and a list of symbols for genes in wheat, as proposed by the National Committee of Genetics and Breeding of the Science Council of Japan; (2) a film on the origin of wheat, made in Japan under the direction of H. Kihara and his colleagues; and (3) the provisional agenda and programme of the International Wheat Symposium, expected to be held in Japan, during 1956.

1843 DELONE, L.
(**Harjkov 4**).
Nauka i Žiznj (Science & Life), Moskva 1954 : No. 5 : p. 35. [Russian].

This new high-yielding wheat variety was obtained by intervarietal hybridization at the Institute of Genetics of the Ukrainian Academy of Sciences. It outyields Odessa 3 by approximately 11% and produces large grains with good baking and milling properties.

1844 FAJERSSON, F.
Weibull's Original Bancovete. (**Weibull's original Banco wheat**).
Agri. hort. genet., Landskrona 1954 : **12** : 150–72.

This new variety (cf. *PBA*, Vol. XXIII, Abst. 1847) has given good results in eastern Götaland, where it has proved resistant to cold, lodging and snow mould and has outyielded Hansa, Skandia IIIB and Eroica I and II. Banco is suitable for mechanical harvesting and the baking quality of its grain is good.

1845 TOBGY, H. A. [AL TOBJI, H. 'A.] & TOBGY, A. H. [AL TOBJI, 'A. UL H.]
A cytological study of the interspecific hybrid *Triticum vulgare* Vill. x *T. pyramidale* Perc.
Proc. Egypt. Acad. Sci. 1953 (1954) : **9** : 40–47.

The configurations $14_{II} + 7_{I}$, $13_{II} + 9_{I}$ and $12_{II} + 11_{I}$ were found in 65·67, 22·67 and 6·67%, respectively, of the metaphase I cells of the F_1 hybrid. The occasional occurrence of a trivalent in the combination $1_{III} + 13_{II} + 6_{I}$ is regarded as an indication of a translocation between chromosomes of the D genome and of either the A or the B genome. The univalents normally split at anaphase I and separated to the poles, but considerable lagging occurred during both anaphases and telophases. Sixty per cent of the pollen formed was stainable.

1846 Tobgy, H. A. [Al Tobji, H. 'A.] & Tobgy, A. H. [Al Tobji, 'A ul H.]
A cytological study of an intraspecific hybrid in *Triticum vulgare* between Egyptian and Kenya varieties, and its bearing on breeding rust resistant wheats.
Proc. Egypt. Acad. Sci. 1953 (1954) : **9** : 48–53.

The parent varieties, Hindi D and Kenya B256, had, respectively, 98·2 and 96·25% normal tetrads and 92·5 and 92·3% stainable pollen. In the F_1 hybrid, two to eight univalents were found in nearly 40% of the cells at metaphase I, the remainder showing the normal configuration of 21 bivalents. The univalents usually split at anaphase I and passed to the poles, but some lagging occurred during both telophases. Inversions were observed in 10% of the cells at anaphase I. The proportions of normal tetrads and stainable pollen were 84·5 and 73·25%, respectively.

1847 Mochizuki, A.
(**Induction of unreduced eggs in Einkorn wheat by delayed pollination**).
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 80–86. [Japanese].

A tetraploid and seven diploid plants of maternal type, as well as five of the expected triploid offspring, resulted from pollinating *Triticum monococcum* var. *vulgare*, nine days after the inception of flowering, with fresh pollen from *T. turgidum* var. *nigrobarbatum*. It is presumed that diploid eggs were responsible for both anomalies.

1848 Tihonov, M. V.
(**Academician Cicin's hybrids**).
Nauka i Žiznj (Science & Life), Moskva 1954 : No. 9 : 36–37. [Russian].

Wheat-*Agropyron* hybrids 1, 186 and 599 are mentioned briefly (cf. *PBA*, Vol. XXIV, Abst. 199).

1849 Mitsuoka, S.
(**Morphology and fertility of F_1 hybrids of *Triticum dicoccum* x *Aegilops squarrosa***).
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 91–96. [Japanese].

F_1 hybrids were obtained from crosses between three varieties of *T. dicoccum*, on the one hand, and *Ae. squarrosa* var. *typica* on the other. The ears of the hybrids resembled those of *Ae. squarrosa*. At metaphase, the most common configuration was 21_I but a pair of loosely associated bivalents frequently occurred, and as many as four bivalents in one hybrid. Six plants were obtained from selfing the hybrids and one from crossing them with *T. macha*. All these F_2 hybrids died young.

1850 Nishikawa, K.
(**Lethality in F_1 plants of *Triticum dicoccum* x *Aegilops squarrosa***).
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 87–90. [Japanese].

All F_1 plants of *T. dicoccum* var. *liguliforme* x *Ae. squarrosa* 2*x* or 4*x* died out in the rosette stage. In the F_1 of (*T. dicoccum* var. *liguliforme* x *T. dicoccoides* var. *spontaneonigrum*) x *Ae. squarrosa* 4*x*, a mixture of normal and lethal offspring resulted. It is inferred that complementary lethal genes occur in *T. dicoccum* var. *liguliforme* and in the D genome of *Ae. squarrosa*, respectively.

1851 Nakajima, G.
Cytogenetical studies on the intergeneric F_1 hybrids between *Triticum vulgare* and three species of *Secale*.
Jap. J. Bot. 1954 : **14** : 194–214.

F_1 hybrids were obtained between *T. vulgare* 'Norin 50' [Ministry of Agriculture and Forestry 50] and 'Norin 70,' on the one hand, and *S. africanum*, *S. montanum* and *S. vavilovii*, on the other. All the hybrids had $2n = 28$ chromosomes. The number of bivalents at metaphase varied from 0 to 6 in *S. africanum* and *S. montanum* and from 0 to 7 in *S. vavilovii*; the modal value was 2_{II} in *S. montanum* and 0_{II} in the other two species. Longitudinal splitting of univalents was observed in all three crosses.

1852 Nakajima, G.
(**Genetical and cytological studies on the breeding of amphidiploid types between wheat and rye. VI. A. Meiosis in the PMCs of F_2 plants of *Triticum compactum* x *Secale cereale***).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 47–52. [Japanese].

A description of meiosis in F_2 plants with 47, 48, 54 and 55 somatic chromosomes is given. The numbers of bivalents in each of the above chromosome types were 15–23 (mode 19), 17–23 (mode 19), 20–26 (modes 23 and 24) and 20–27 (modes 24 and 27), respectively. One metaphase plate with $43_{II} + 8_{I}$ chromosomes was found among the 47-chromosome plants. Cells with (1) $2_{II} + 15_{I}$ and (2) $7_{II} + 14_{I}$ or $8_{II} + 12_{I}$ were noted among the 54 and 55 chromosome hybrids, respectively.

1853 NAKAJIMA, G.
(Genetical and cytological studies on the breeding of amphidiploid types between wheat and rye. VI. B. Meiosis in the pollen mother cells of F_2 plants of *Triticum compactum* x *Secale cereale* with $2n = 56$ and 58).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 53–58. [Japanese].

In continuation of the paper summarized in Abst. 1852, the author describes meiosis in hybrids with 56 or 58 somatic chromosomes. In the 56-chromosome plants, 22–28 bivalents were formed, the modal values being 26 and 27. Occasional metaphase plates with $7_{II} + 14_{I}$, $8_{II} + 12_{I}$ or $14_{II} + 14_{I}$ chromosomes were noted. Some of the 56-chromosome plants were highly fertile and are presumed to be of the genomic constitution ABDR. The 58-chromosome plants formed 23–29 bivalents, the modal value being 28. Occasional quadrivalents were noted.

1854 ROY, R. P.
Cytogenetic investigations in intergeneric amphiploids between *Aegilops* and *Triticum*, and a study of their phylogenetic relationship.
Abstr. Diss. Univ. Camb. 1952–53 (1955) : 6–8.

Most of the 14 intergeneric amphidiploids induced by colchicine treatment showed normal cytological behaviour and fertility in the A_1 to A_3 generations. The presence of univalents and multivalents did not affect fertility and no correlation was detected between degree of pairing in the F_1 hybrids and multivalent formation in the derived amphidiploids. A monosomic individual was as fertile as plants with a complete set of chromosomes. Two amphidiploids were however completely or almost completely sterile, although pairing was normal. Aneuploid cells were observed in all the amphidiploids but the frequency of such cells significantly decreased in subsequent generations and in some cases this decrease was associated with increased fertility. *Ae. sharonensis* was subjected to genome analysis by means of meiotic studies of appropriate interspecific hybrids and intergeneric amphidiploids with *Triticum*. It was found that semilethality occurred in certain amphidiploid x 6*n* wheat crosses whenever the genome of *Ae. bicornis* was combined with that of *Ae. squarrosa*; the presence of the *Ae. squarrosa* genome in the 6*n* wheats was thus confirmed. Hybrids of 42-chromosome amphidiploids with 6*n* wheats did not show the degree of chromosome pairing expected from their genomic constitution and were very highly sterile. Hybrids between the amphidiploids displayed even less pairing than those with *T. vulgare*. The possibility of improving the bread wheats by transference of characters from 2*n* species of *Aegilops* in combination with 4*n* wheats, as suggested by McFadden and Sears, is therefore doubted.

1855 RYŽEĬ, I. P.
(Development of a soft winter wheat from a hard spring variety).
Agrobiologija (Agrobiology) 1954 : No. 6 : 110–11. [Russian].

At the Kirgizian breeding station, a single plant of *Triticum vulgare* var. *nigriaristatum* was discovered in a field planted with the hard wheat Hordeiforme 44. It bred true and is thought to have arisen from the hard wheat by conversion. This new form, Nigriaristatum 46, has been multiplied and in the 1954 trials it yielded 7·2 c. more grain per ha. than Hordeiforme 44.

1856 TIMOFEEVA-TJULINA, M. T.
(The method of training plants when changing spring wheats into winter wheats).
Agrobiologija (Agrobiology) 1954 : No. 6 : 97–109. [Russian].

At Nemčinovka, the best results were obtained by sowing spring wheats in late autumn the first year and in early autumn the following year. Some winter forms obtained by this technique and some hybrids from crosses between winter and spring wheats surpassed the standard PPG599 in yield and hardiness. Among the forms that failed to acquire the winter habit by the method described above was a multiple hybrid derived from the winter wheat Zernogradka. It was superior in yield and quality of grain to the spring wheat Moskovka, a standard for this district.

1857 ARTHUR, J. R. B.
Prehistoric wheats in Sussex.
Sussex Archaeol. Collect. **92** : Pp. 47.

An account is given of the remains of *Triticum spelta* in an underground granary-pit discovered during 1951 on the Wickbourne Estate, Littlehampton, Sussex, England. The granary contained pottery dated as Early Iron Age.

1858 TÉLLEZ, R. & CIFERRI, F.
Trigos arqueológicos de España. (**Spanish archaeological wheats**).
Inst. nac. Invest. agron., Madrid 1954 : Pp. 129.

An experiment in which grains of a number of species of *Triticum* were carbonized artificially showed that most of them changed their shape noticeably, becoming generally shorter. In the light of these findings a study was made of a number of archeological specimens of wheat found in different parts of Spain. The majority belong to *T. aestivum* and although occasional specimens of *T. dicoccum* and *T. turgidum* occur it is concluded that *T. aestivum* was the first wheat to enter Spain, being brought in the Bronze Age from the Near East. *T. dicoccum* occurs only in finds dating from the 8th century BC and later and is thought to have been introduced from the Danube area. No specimens have been found of *T. spelta*, *T. monococcum*, *T. durum* or *T. polonicum* and these species, which are grown in Spain today in small quantities, are considered to be later introductions.

1859 MATSUMURA, S.
Chromosome analysis of the Dinkel genome in the offspring of a pentaploid wheat hybrid. IV. Gene-analysis.
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 36–45.

Data from the F_2 of *Triticum polonicum* var. *vestitum* x *T. spelta* var. *duhamelianum* and from the back cross of this hybrid with *T. polonicum* indicated that the red seedling colour of *T. spelta* is dominant over the green colour of *T. polonicum* seedlings and dependent upon a single gene (*Rc*) situated in a chromosome of the A or B genome. Investigations on the inheritance of leaf-rust resistance in *T. polonicum* x *T. spelta* and *T. durum* var. *reichenbachii* x *T. vulgare* var. *erythrospermum* confirmed the preliminary conclusion that the susceptibility of *T. vulgare* depends upon genes in chromosomes belonging to genome D. The pentaploid hybrids are however regarded as valuable for breeding rust-resistant *T. vulgare* types, since (1) they contain various combinations of chromosomes of the A and B genomes originating from both the 4*n* and 6*n* parents and (2) crossing-over between a chromosome of the D genome and one from A or B is considered to be a possibility. The usefulness of gigas plants derived from the a–g series of nullisomic dwarfs is also considered to be worth investigation in breeding for rust resistance. With reference to the results obtained in previously reported experiments (cf. *PBA*, Vol. XXIII, Absts. 1053–55), the author concludes with a theoretical discussion on the use of (1) back crosses, (2) D haplosomics and (3) nullisomics as a means of genetical analysis of genome D in pentaploid hybrids.

1860 MARTY, M.
Effets de la pénurie d'oxygène sur les mitoses des germinations de blé. (**Effects of reduced oxygen supply on mitoses in germinating wheat**).
Rev. Cytol., Paris 1954 : **15** : 107–37.

The course of mitosis was studied in germinating grains of the variety Fylgia under conditions of anoxia and under normal conditions preceded by anoxia. Absence of oxygen brought about stathmocinesis and inhibited formation of the metaphase spindle. On returning the seedlings to normal conditions, the cells recovered but metaphase spindles were not formed in cells which had already begun to divide. However, telophase spindles, which the author regards as distinct from metaphase spindles, and as having a different type of striation, are not inhibited.

1861 PERSON, C.
An analytical study of chromosome behavior in a wheat haploid.
Canad. J. Bot. 1955 : **33** : 11–30.

The configuration and distribution of the chromosomes of nearly 2000 meta-anaphase I cells of a haploid plant from the progeny of a mutant of *Triticum aestivum* 'Thatcher' are recorded and analysed statistically. The results, supplemented by cytological observations on diploid material, suggest that there are 14 partially homologous chromosomes, which may pair to give bivalents or side-by-side (s–s) associations, and seven chromosomes without homologues. Both kinds may occur as unassociated univalents or in end-to-end associations. In s–s associations the division and subsequent equal distribution of the daughter halves to the poles appear to occur earlier than in the bivalents. The movement of univalents is apparently influenced by other chromosomes. Where many bivalents are present, a high proportion of univalents occurs at the plate; where there are few bivalents, the distribution is more complex. There is a final increase in the number of univalents at the plate at the end of meta-anaphase.

1862 BHADURI, P. N. & MAJUMDAR, B. R.
An improved pollen grain smear method for wheat.
Stain Tech. 1955 : **30** : 93–98.

A permanent smear method for pollen grains of

Triticum spp. is described, in which pretreatment of the anthers with 0·2% colchicine solution at room temperature and then by 0·002 M 8–oxyquinoline at 10–14° C, prior to fixing, has been introduced to spread the chromosomes and to differentiate the regions of constriction (cf. Abst. 890).

1863 VALLE, O.
Kevätvehnän leikkuupuinnista korjuukautena 1954. (**On combine harvesting of spring wheats in the 1954 harvest**).
Koetoim. ja Käytäntö 1954 : p. 37.

Among the data provided in this article on combine harvesting in Finland are comparative figures for the percentage germination of the grain of different spring wheat varieties harvested with various water contents.

1864 PISAREV, V. E. & ŽILKINA, M. D.
(**Methods for improving the spring wheat variety Moskovka**).
Zemledelie (Agriculture) 1955 : No. 1 : 90–91. [Russian].

Heritable changes were obtained in Moskovka, a variety characterized by a very short dormant period. A second dormancy was induced by submerging the seed whilst fully ripe for 30 minutes in water kept at 55° C. Even better results were obtained by subjecting grains that were in the condition of waxy ripeness to temperatures of 3–5° C. The succeeding generations had considerably longer post-harvest dormancy periods and produced a high percentage of grains with pink or red endosperms. Among 175 plants raised from coloured grains, 72 were white, 102 coloured and one plant bore 80 red and 19 white grains. The red-grained forms set 3·9% more grains than the normal type of Moskovka. Similar changes in productiveness and grain colour were observed in some Moskovka plants that had developed from fallen grains. The new forms are under observation.

1865 NIKIFOROVA, I. L.
(**Supplementary pollination of wheat with foreign pollen**).
Agrobiologija (Agrobiology) 1954 : No. 6 : 111–14. [Russian].

At Puškin, supplementary pollination with rye pollen resulted in an increased grain set and in an F_1 with earlier maturity and improved winter hardiness. The beneficial effect of supplementary pollination upon hardiness was most marked in crosses between the nonhardy varieties Ukrainka and Odessa 3. Although the initial wheat varieties and hybrids were awnless, supplementary pollination with rye pollen gave rise to some awned forms.

1866 VIGOROV, L. I.
(**Modes of developing branched ears in soft spring wheats**).
Bjull. mosk. Obšč. Ispyt. Prirod. (Bull. Moscow Soc. Nat.) 1954 : No. 5 : 53–58. [Russian].

Experiments in the central Urals on training wheats for the branching habit are described. Most varieties developed branching ears when grown upon rich soil for several generations, though some responded more readily to treatment than others. Mention is made of varieties that have produced 70–80% branching ears. Four distinct modes of branching, each characteristic for certain varieties, are described: (1) ears with closely packed supplementary florets; (2) ears with additional florets in elongated spikelets, (3) ears with twice the normal number of spikelets; and (4) forked ears. Ears with an increased number of spikelets are regarded as the most valuable type economically. It is thought that the wheat of the future might combine firm straw with very lax ears resembling the panicles of rice or millet.

1867 HARRIS, R. H.
Flour particle size and its relation to wheat variety, location of growth, and some wheat quality values.
Cereal Chem. 1955 : **32** : 38–47.

Fractions separated from experimentally-milled hard red spring wheats according to particle size were influenced by locality of growth and variety. Particle-size distribution was found to be a more sensitive measure of variations in milling quality than flour yield and probably also flour ash content.

1868 YAMASHITA, K.
The quality of Einkorn wheat.
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 32–35.

Investigations on the milling and baking properties of Einkorn flour revealed its general inferiority, whether blended or not, compared with flour of common wheat having a similar protein percentage.

1869 IRVINE, G. N. & ANDERSON, J. A.
An improved wheat prediction test for macaroni quality.
Cereal Chem. 1955 : **32** : p. 88.

Information is provided on a revised method of predicting the pigment content of macaroni from determinations of the lipoxidase activity and pigment content of ground whole-wheat samples (cf. *PBA*, Vol. XXIII, Abst. 2580 and Vol. XXIV, Abst. 1845).

1870 Maes, E. & Peeters, G.
La valeur boulangère des races sélectionnées de froment belge—Récolte 1953. Comparaison avec les races cultivées au Grande-Duché de Luxembourg. (**The baking quality of selected varieties of Belgian wheat—1953 harvest. A comparison with the varieties cultivated in the Grand Duchy of Luxembourg**).
Rev. Agric., Brux. 1954 : **7** : 1423–39.

Tests of samples of 19 winter and spring wheats obtained from the plant breeding stations at Gembloux and Heverlé have shown that Capelle, Lille Desprez, Alba and Fylgia are superior in baking quality to all other varieties grown in Belgium and Luxembourg.

1871 Schäfer, W.
Möglichkeiten zur Verbesserung der Qualität des Brotgetreides bei Züchter und Erzeuger. (**Possibilities of improving the quality of bread cereals on the part of the breeder and the producer**).
Arch. dtsch. LandwGes. 1954 : **14** : 90–102.

The view is expressed that the emphasis placed in recent decades upon obtaining higher yields has led to too little attention being paid in Europe to breeding for improved quality. Crosses should therefore be effected between high-yielding European varieties and American wheats of good baking quality to combine these two characters. In addition, greater use could be made of Hauters II, Taca, Tassilo, Koga I and II, Carstens Sommerweizen [Carsten's spring wheat], Peragis Garant, Lichtis früh [Lichti's Early], Strubes Fortschritt [Strube's Progress] and Janetzkis Markgraf [Janetzki's Margrave]. These varieties are superior in baking quality to all other wheats grown in Germany and should prove valuable as breeding material.

1872 Pané Mercé, J.
Un nuevo trigo español, de elevado rendimiento, productor de harina de fuerza y muy resistente al encamado y a la roya. (**A new Spanish wheat characterized by high yield, flour of high strength and resistance to lodging and rust**).
Agricultura, Madr. 1954 : **23** : 509–11.

The wheat Pané 4, selected from a cross of Red Fife x Ardito, is described as a winter wheat with high tillering capacity, capable of growing in very fertile ground without lodging; it has remained free from rust and gives high yields of grain of good quality, with a gluten content of 26% or over.

1873 Samsonov, M. M.
(**Production of high-quality wheats**).
Zemledelie (Agriculture) 1955 : No. 2 : 89–91. [Russian].

It is urged that more attention be paid to breeding for improved baking quality, such as that possessed by the strong wheats Sarrubra, Caesium III and Ukrainka. In recent years varieties with good baking-quality have tended to be superseded by new high-yielding varieties of inferior quality, such as the winter wheat Odessa 3 and the spring wheats Albidum 3700 and Milturum 553, both of which were bred at Omsk, and Albidum 43, produced at Saratov. Existing varieties that possess good baking properties should be conserved and their cultivation expanded.

1874 Marušev, A. I.
(**Technological properties of spring and winter wheats**).
Zemledelie (Agriculture) 1955 : No. 2 : 92–96. [Russian].

Data on the technological properties of a number of high-yielding bread and macaroni wheats are presented. New soft spring wheats with good baking and milling properties recently bred at Saratov include Steklovidnaja 1 [Vitreous 1], which is equal to the hard wheats Hordeiforme 432 and Melanopus 69 in macaroni quality, and Alborubrum 2696, which originates from Krasnyĭ Kut and has properties similar to those of Steklovidnaja 1. Mention is also made of the new soft winter wheat Lutescens 230, which is winter hardy and highly productive and possesses good baking properties.

1875 Pesola, V. A. & Veijola, T.
Vehnän kvaliteettijalostuksesta ja sen tuloksista suomessa. (**Breeding wheat for quality and its results in Finland**).
Maataloust. Aikakausk. 1954 : **26** : 178–94.

A brief review of wheat growing in Finland from 1920 onwards is given, followed by a detailed account of the results of experiments on the baking qualities of spring and winter varieties. Special attention is given to valorimeter figures, water binding capacity and Pelshenke figures.

Of winter wheat varieties, Vakka [Bushel] has good milling and baking properties. Olympia and Varma [Sure], although of good quality, are only of limited agricultural value. In the Finnish spring-wheat breeding programme, varieties have been selected for a combination of good baking quality with earliness, Swedish varieties tending to be too late. Apu [Aid], Sopu [Concord], Tammi, Kiuru [Lark], Hopea [Silver], Kimmo [Elasticity], Terä [Edge] and Touko [Sowing] are all earlier than the Swedish Timantti [Diamond] and are of satisfactory baking quality.

Spring wheats of satisfactory quality may be safely grown in Finland when summer conditions are favourable, but on account of their higher yielding capacity and greater resistance to adverse weather conditions, the cultivation of winter wheat should be extended.

1876 BROEKHUIZEN, S.
De kwaliteit van de inlandse tarwe voor de broodbereiding. (**The quality of home-grown wheat for making bread**).
Jaarb. algem. Bond Oud-leerl. Inricht. Middelbaar LandbOnderwijs., Wageningen 1953–54 (1954) : 199–205.

A brief note on the comparative baking quality of the principal varieties cultivated in the Netherlands is included and the possibility of combining high yield with good baking quality is discussed in general terms.

1877 WAGNER, S.
Praktische Erfahrungen mit der Weizen-Qualitätszüchtung in der Schweiz. (**Practical experiences in breeding wheat for quality in Switzerland**).
Mitt. schweiz. Landw. 1955 : **3** : 1–10.

Information is given on the baking quality of the principal varieties cultivated in Switzerland and on the distribution of varieties in the German-speaking and French-speaking parts of the country, respectively. Breeding for improved quality at the federal research stations at Zürich-Oerlikon and Mont-Calme, Lausanne, is also surveyed briefly.

1878 CALLAGHAN, A. R.
Quality in the Australian wheat crop.
J. Dep. Agric. S. Aust. 1954 : **58** : 3–10; also Agric. Gaz., NSW 1954 : **65** : 416–21, 490–93.

The author gives a historical survey of the problem of quality in Australian wheats, with reference to breeding, varieties, farming practices and the requirements of the home and overseas markets.

1879 FAJERSSON, F.
Lagringens inverkan på bakningsförmågan hos vete av olika sort och proteinhalt. (**The effect of storage on the baking quality of different varieties of wheat and of wheats varying in protein content**).
Agri hort. genet., Landskrona 1954 : **12** : 173–90.

Experiments were carried out to determine the effect of storage for periods of up to two years on the baking quality and protein and gluten contents of the principal Swedish varieties. Among the winter wheats, varieties of good baking quality deteriorated more rapidly than those whose baking quality was poor or mediocre. Nevertheless, Ertus was still superior to all other varieties even after being stored for two years, in marked contrast to Ergo, a variety with poor baking quality which had suffered hardly any deterioration through storage. Of the spring wheats, the baking quality of Kärn II [Kernel II] deteriorated less rapidly than that of either Pondus or Brons [Bronze], and was markedly superior to that of both varieties before and after storage. Significant varietal differences due to storage were not observed in the protein or gluten contents of either spring or winter wheats.

1880 Zomertarwe, 1955. (**Spring wheat, 1955**).
Landbouwvoorlichting 11 : Bijl. 27; Ber. Rassenkeuze 1954 : No. 179 : unpaginated.

Brief descriptions are given of four new red-grained varieties which, in interprovincial trials conducted in the Netherlands in 1954, outyielded the standard Peko (cf. *PBA*, Vol. XXIV, Abst. 1886) on almost all types of soils and also matured earlier. Koga II and Strube's 4090 are German introductions with short, stiff straw. The Belgian variety Phoebus grows rapidly but is susceptible to lodging. Svenno, introduced from Sweden, has very short straw but is not as resistant to lodging as Peko; in addition, it is susceptible to yellow rust. It is considered that, despite its slightly lower yield of grain, Peko is more suitable for cultivation under Netherlands conditions than are any of these four recent introductions; it also produces a higher yield of straw.

1881 **Wheat Inventory I.**
Foreign and domestic bread wheats (*T. vulgare* or *T. compactum*) carried in the World Collection under cereal investigation (C.I.) numbers (with plant introduction numbers for reference).
US Dep. Agric. 1952 : Pp. 35. (Mimeographed).

Wheat Inventory II.
Foreign and domestic durum wheats (*T. durum*) carried in the World Collection under cereal investigation (C.I.) numbers (with plant introduction numbers for reference).
Ibid. 1952 : unpaginated. (Mimeographed).

Wheat Inventory III.
Foreign bread wheats (*T. vulgare* or *T. compactum*) carried in the World Collection under plant introduction (P.I.) numbers.
Ibid. 1952 : unpaginated. (Mimeographed).

Wheat Inventory IV.
Foreign durum wheats (*T. durum*) carried in the World Collection under plant introduction (P.I.) numbers.
Ibid. 1952 : unpaginated. (Mimeographed).

Supplement No. I to 1952 Wheat Inventories I and II.
Foreign and domestic bread and durum wheats carried in the World Collection under cereal investigation (C.I.) numbers (with plant introduction numbers for reference).
Ibid. 1954 : Pp. 23. (Mimeographed).

Wheats in the US world collection are listed in order of their CI or PI numbers, together with their names or parentage, country of origin, growth habit and grain colour.

1882 Asana, R. D. & Mani, V. S.
Studies in physiological analysis of yield. II. Further observations on varietal differences in photosynthesis in the leaf, stem and ear of wheat.
Physiol. Plant. 1955 : **8** : 8–19.

Further evidence has been obtained that varietal differences exist in the contributions to increase in plant weight, i.e. net assimilation, by photosynthesis in the leaf, ear and stem of wheat during the period after ear emergence (cf. *PBA*, Vol. XX, Abst. 1558). The seasonal variation in the contribution from the ear to net assimilation was much smaller than that shown by the contributions from the foliage and stem. With a few exceptions, varietal differences in the contribution from the ear appeared to be related to the presence of awns and variation in spikelet number. Varietal differences in the contributions to net assimilation from the leaves and stem could to some extent be explained on the basis of functional area. The data suggested that grain filling was the result of photosynthesis after anthesis and was almost independent of any supply of reserve material from the stem.

1883 Yamada, T. & Horiuchi, S.
(Studies on the occurrence and mechanism of nongenetic variation due to competition. VI. Intervarietal competition of wheat reared in water culture, and, in particular, on the role of the tendency towards the prostrate habit as a factor affecting this characteristic).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **4** : No. 1 : 3–8. [Japanese].

A comparative study was made of the growth of the erect variety Shinchunaga and the prostrate variety Norin 22 [Ministry of Agriculture and Forests 22], when grown (1) in pure stands in pots supplied with an adequate culture solution, and (2) intermixed under similar cultural conditions. Intermixing gives a competitive advantage to the erect variety in respect of tiller and leaf number and top weight. Height and leaf length are not much affected. Since the supply of water and nutrients was abundant, it is assumed that the competitive effect resulted from unequal availability of light.

It is pointed out that the effect of competition between erect and prostrate plants should be allowed for in selecting segregating populations, especially as the prostrate habit tends to be associated with such useful characteristics as winter hardiness.

1884 Šulyndin, A. F.
(Inheritance of ability to synthesize sugar in interspecific wheat hybrids in connexion with improved hardiness of the plants).
Ž. obšč. Biol. (J. gen. Biol.), Moskva 1954 : **15** : 336–52. [Russian].

Winter wheats, in general, have higher sugar contents than semiwinter or spring varieties. F_1 hybrids between hard spring or semiwinter wheats and soft winter wheats which had been grown as winter wheats were characterized by a low sugar content. In the F_2, F_3 and F_4 the amount of sugar produced increased. The ability to produce high sugar levels increased in successive generations more quickly in the segregates of the *T. vulgare* type than in those of *T. durum*. Some soft wheat families produced larger amounts of sugar in the F_4 than the winter wheat parent. In the hard wheat segregates considerable increases in the sugar content took place in the F_3 and F_4. In some F_4 hard wheats the sugar content was only 5% below that of normal winter wheats. The sugar content of the hybrids was correlated with their overwintering capacity. Contrary to Lysenko's thesis that it is impossible to obtain winter varieties of *T. durum*, winter forms of that species with 28 chromosomes were obtained. They proved hardy under the climatic conditions of Harjkov.

1885 MALIANI, C.
Il frumento "Giovanni Giuliari." (**The wheat Giovanni Giuliari**).
Humus 1954 : **10** : No. 10 : p. 17.

By selection from Strampelli's wheat San Pastore, which was deficient in standing capacity, a form has been produced which excels San Pastore in rust resistance and has shorter and stronger straw and larger grain; in cold resistance, earliness and most other characters it is similar to San Pastore. It has been named Giovanni Giuliari (cf. *PBA*, Vol. XXIII, Abst. 2530).

1886 CARTER, M. V.
Additional genes in *Triticum vulgare* for resistance to *Erysiphe graminis tritici*.
Aust. J. biol. Sci. 1954 : **7** : 411–14.

In continuation of the study summarized in *PBA*, Vol. XXIV, Abst. 1020, work on the resistance of the varieties Birdproof, Chul, Normandie and Federation to the two mildew races P and P–1 is reported. The presence in Birdproof of a second gene, Ml_b, similar in effect but not allelic to the gene Ml_s previously identified in Indian, Sonora and Sturgeon, is confirmed. It confers resistance to both races from the three-leaf stage onwards. Chul possesses a single dominant gene, Ml_c, for resistance to P–1 at all stages of growth and Normandie carries the Ulka gene Ml_u for resistance to both races. There is some evidence indicating the presence in either Birdproof or Federation of a dominant gene, L_s, which modifies the effect produced by one of the resistance genes so that the leaf sheath of the seedling becomes susceptible.

1887 DUFF, A. D. S.
Resistance to "take all" disease in Kenya wheat 131.
E. Afr. agric. J. 1954 : **20** : 120–21.

Variety 131 was more resistant to root infection by *Ophiobolus graminis* in Kenya than four other varieties tested. Slight infection appeared to have no damaging effect on plant health.

1888 HEYNE, E. G. & HANSING, E. D.
Inheritance of resistance to loose smut of wheat in the crosses of Kawvale x Clarkan.
Phytopathology 1955 : **45** : 8–10.

The resistance of Kawvale to race 11 of *Ustilago tritici* was dominant over the susceptibility of Clarkan and depended upon at least two factors, viz. a major one for a high degree of resistance and a minor one conferring moderate resistance. Combination of these two genes resulted in immunity. No association of reaction to race 11 of loose smut with response to leaf rust or awn expression was detected.

1889 SCHROEDER, H. W.
Reaction of spring wheat varieties and selections to artificial inoculation with loose smut.
Plant Dis. Reptr. 1954 : **38** : 882–86. (Mimeographed).

Tabulated results of a trial conducted at St. Paul, Minn., in 1953–4 are presented which show that the percentages of smut-infected heads in 109 varieties and selected lines of wheat raised from the seed of plants inoculated with *Ustilago tritici* ranged from 0 to 91%. It is suggested that resistant lines may be obtained by adequate selection.

1890 NOLL, A.
Auftreten und Verbreitung physiologischer Rassen des Weizengelbrostes (*Puccinia glumarum*) in der Bundesrepublik Deutschland in den Jahren 1946–52. [**The occurrence and distribution of physiological races of yellow rust of wheat (*P. glumarum*) in the German Federal Republic in the years 1946-52**].
NachrBl. dtsch. PflSchDienst., Berl. 1955 : **7** : 10–13.

A study of the comparative prevalence of different physiological races of *P. glumarum* in western Germany during 1946–52 indicated that race 7, already the most common race, is increasing at the expense of all other races. A total of eleven physiological races were identified.

1891 Salazar, J.
Razas fisiológicas de *Puccinia graminis* f. sp. *tritici* Eriks et Henn y *Puccinia rubigo-vera* f. sp. *tritici* (Eriks) Carl., en España en 1953–54. [**Physiological races of *P. graminis* f. sp. *tritici* Eriks. et Henn. and *P. rubigo-vera* f. sp. *tritici* (Eriks.) Carl. in Spain in 1953-54**].
Bol. Inst. Invest. agron., Madr. 1954 : **14** : 383–94.

Further investigations (cf. *PBA*, Vol. XXIV, Abst. 1870) have shown the presence of races 14, 16, 17, 21, 24, 75 and 133 of *P. graminis* and races 4, 45, 58, 61, 67, 84, 85 and 86 of *P. rubigo-vera*. Some of them are races described for the first time and include forms of *P. graminis* capable of attacking Khapli wheat.

1892 Freitas, A. P. do C. e
Raças fisiológicas de *Puccinia rubigo-vera* f. sp. *tritici* (Erikss. & Henn.) Carl. isolades em Portugal. [**Physiological races of *P. rubigo-vera* f. sp. *tritici* (Erikss. & Henn.) Carl. isolated in Portugal**].
Agron. lusit. 1954 : **16** : 151–74.

Races 11, 75, 76, 78, 84, 87 and 107 were isolated from wheat and *Aegilops* spp., in addition to which races 73 and 74 were isolated from *Thalictrum* spp. The most common race on wheat in Portugal proved to be 11, together with 87 which is closely allied to it. Races of group 9 seem to be absent from the Iberian peninsula.

Some of the wheat varieties grown in Portugal gave mixed reactions to certain races, and were evidently genetically heterogeneous. Segregates displaying resistance to the races tested were observed in the varieties Tremês rijo [Strong Tremês], Mourisco, Durazio rijo [Strong Durazio] and Espanhol [Spanish].

1893 Vasudeva, R. S.
Recent developments in plant diseases in India.
Plant Prot. Bull. 1954 : **3** : 22–23.

The occurrence of the following new races is reported: a race of *Puccinia graminis* var. *tritici*, provisionally designated C, collected from the wheat Kenphad–28; a race of *P. triticina*, producing type–4 infection on the differential wheat Mediterranean; and a race (I_5) of *Melampsora lini*, causing symptoms on the differential flax varieties Argentina and Koto.

1894 Vasudeva, R. S., Lele, V. C. & Misra, D. P.
A new physiologic race of *Puccinia graminis tritici* (Pers.) Erikss and Henn. in India.
Indian Phytopath. 1953 : **6** : p. 141.

Resistance to a new physiological race, which is allied to race 72, is shown by the wheat varieties Marquis, Reliance, Kota, Arnautka, Mindum, Spelmar and Vernal. Little Club has shown high resistançe between 49° and 88° F. and moderate susceptibility between 40° and 79° F.

1895 **Canada's new wheat resistance to rust.**
Times agric. Rev. 1955 : No. 12 : p. 9.

An outline is given of the origin and subsequent multiplication and distribution of the 15B rust-resistant variety Selkirk (cf. *PBA*, Vol. XXIV, Abst. 1786).

1896 Hart, H.
Complexities of the wheat stem rust situation.
Trans. Amer. Ass. Cereal Chem. 1955 : **13** : 1–14.

This general review of the wheat stem rust problem in the USA and Canada includes brief accounts of the changes that have occurred in rust populations, the use of sets of wheat differentials for identifying different races, the present state of breeding for resistance to race 15B and the degrees of resistance to various races at high and low temperatures shown by the varieties McMurachy, Selkirk, Frontana, Willet and Sentry.

1897 Villanueva Novoa, R.
Progreso en el mejoramiento del trigo para resistencia a las royas especialmente para la raza 15B de *Puccinia graminis tritici*. (**Progress in breeding wheat for resistance to rust, especially to race 15B of *P. graminis tritici***).
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1953 : **2** : No. 3 : 2–5.

This is an extract from the report referred to in *PBA*, Vol. XXIV, Abst. 1030.

1898 Fitzgerald, P. J.
Inheritance of resistance to certain physiologic races of leaf rust of wheat *Puccinia rubigo-vera tritici* Erikss.
Diss. Abstr. 1954 : **14** : Publ. No. 9342 : 2173–74.

Investigations were carried out on the resistance of selection 3369–61–1–1–10–8 to several leaf-rust races. This selection is believed to have originated from an outcross of a Wabash x American Banner hybrid with an unknown leaf-rust resistant wheat. Data from various crosses led to the conclusion that (1) resistance to race 5 depends upon the dominant gene Lr_4, (2) resistance to race 65 is controlled by the duplicate recessive factors, lr_5 and lr_6, and (3) the resistant reactions to races 76, 9 and 15 are conditioned by the dominant genes Lr_7, Lr_8 and Lr_9 respectively. The factors Lr_7 and Lr_9 are closely linked. The gene Lr_8 is epistatic to a dominant factor for susceptibility to race 9.

1899 VILLANUEVA, R.
Herencia de la resistencia. (**Inheritance of resistance**).
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1953 : **2** : No. 2 : 12–14.

This is an extract from the bulletin referred to in *PBA*, Vol. XXIV, Abst. 1026.

1900 THORPE, H. C.
Release of new cereal varieties—V.
E. Afr. agric. J. 1954 : **20** : 133–34.

Notes are given on three wheat and two barley varieties which have been tested at Njoro, Kenya, and recently released to farmers.

The wheats R64 and 351ASIB2 show seedling resistance to twelve strains of *Puccinia graminis* var. *tritici* in trial plots but have been slightly attacked in the field.

R64, a white-chaffed, red-grained variety of mid-season maturity, was selected at Njoro from the Canadian spring wheat DC x Ceres. The straw is rather weak but the grain is of good baking quality. It has a growing season of 5½–6 months and may be grown on good soil in all areas between 7000 and 8000 ft.

Variety 351ASIB2, selected at Njoro from 117A x Regent 975·6, is a beardless, white-chaffed, red-grained wheat of moderate yield and baking quality. It has fair straw strength and is resistant to *Puccinia glumarum* up to 8500 ft. Its growing season is 5–5¼ months and it is suitable for areas in Kenya between 7000 and 8500 ft.

The yellow-rust resistant American durum wheat, Carleton CI12064 and the Scandinavian barleys Herta and Kenia are also described and their climatic requirements noted.

1901 SHUKLA, T. N.
Factors affecting variability in cereal rust reactions. I. Variability caused by temperature.
Indian Phytopath. 1953 : **6** : 67–79.

The reactions of nine wheat varieties to races 15 and 15B of *Puccinia graminis* var. *tritici* at different temperatures are described.

At low and moderate temperatures (60–65° and 70–75° F.), Newthatch and two Kenya wheats, K58 and K117A, were extremely resistant to race 15, while at high temperatures (80–85° F.) all three varieties were susceptible. Newthatch was mesothetic in reaction to 15B at 60–65° F. and susceptible at the higher temperatures. K58 and K117A were highly resistant to 15B at constant low and moderate temperatures and moderately susceptible above 82° F.; with high day and low night temperatures both varieties were moderately resistant.

At all temperatures, Mida, Marquis, Mindum and Stewart were susceptible and Frontana moderately susceptible to both races, while Lee was resistant to 15 but susceptible to 15B.

1902 GREEN, G. J. & JOHNSON, T.
Effect of high temperature on the reaction of adult wheat plants to stem rust.
Proc. Canad. phytopath. Soc. 1954 : No. 22 : 13–14. (Abst.).

Of ten wheats tested in Manitoba for reaction to stem rust races 11, 12, 15A, 15B, 15B–1, 15B–2, 15B–3, 17A, 29, 29A and 139 at temperatures of about 60° and 80° F, the two varieties K338AC2E2 and K117A were highly resistant to all races at both temperatures. McMurachy was resistant to 15B–1 and 15B–2 at the low and susceptible at the high temperature, but was resistant at both temperatures to the other races except 12, 15B–3, 29A and B9, which could attack it at both temperatures. Selkirk resembled one of its parents, McMurachy, in its reaction to 12, 29A and the three biotypes of 15B, and its other parent, Redman, in its resistance at both temperatures to B9.

1903 HARRIS, R. H., SIBBITT, L. D. & SCOTT, G. M.
Milling and macaroni-making quality of some new durum wheat hybrids.
Bi-m. Bull. N. Dak. agric. Exp. Sta. 1955 : **17** : 95–100.

Details are given of preliminary tests carried out at Langdon, N. Dak., in which five hybrids of the series LD with resistance to stem rust 15B proved superior in yield and quality of semolina and macaroni to four commercial varieties.

1904 GO, M.-Ž. [KUO, M.-C.]
(**Science in new China**).
Vestn. Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1954 : No. 10 : 8–16. [Russian].

Mention is made of a new wheat variety, Bima

1, bred in Shensi. It shows resistance to rust and lodging and outyields local material by 20–30%.

1905 EKBOTE, R. B. & KAUSHAL, P. K.
Strain 65 is a choice wheat.
Indian Fmg. 1955 : **4** : No. **11** : p. 7.

Strain 65, developed at Powarkheda, Hoshangabad, Madhya Pradesh, from a cross involving the improved local strain Sharbati A115 and a rust-resistant Australian variety Bobin x (Bobin x Gaza) is widely adapted, rust-resistant and of mid-early maturity; it produces plump grain with high protein content.

1906 PAL, B. P., VASUDEVA, R. S. & KOHLI, S. P.
Breeding rust resistant hill wheats in India.
Res. Ser. Indian Counc. agric. Res. 1954 : No. 5 : Pp. 52.

As a result of breeding carried out over the period 1934–52 at the Wheat Breeding Station, Simla, with the aim of combining the rust resistance of foreign introductions with the desirable characters of adapted Indian hill wheats, a number of hybrids with high resistance to individual rust species and a promising complex hybrid, NP809, with simultaneous resistance to black, brown and yellow rusts have been obtained and are undergoing regional tests. The variety NP770 and the Australian wheat Ridley have shown promise at high altitudes (cf. *PBA*, Vol. XXIII, Abst. 1042). The results of yield trials carried out so far are tabulated.

1907 ÅKERMAN, Å.
Stråbassjukdomarna på sädesslagen. (**Diseases of the straw base in cereals**).
Lantmannen, Stockholm 1955 : **39** : 77–79.

The history of work on the control of *Cercosporella herpotrichoides* and *Ophiobolus graminis* of cereals in Sweden is briefly outlined and the following wheats resistant to the former disease are noted: the spring varieties Odin, Svenno, Drott [King], Pondus and Progress and the autumn wheat Skandia IIIB. No marked varietal differences in resistance to *Ophiobolus graminis* have been observed.

1908 PATEL, M. K., KAMAT, M. N. & PADHYE, Y. A.
A new *Helminthosporium* on wheat.
Indian Phytopath. 1953 : **6** : 15–26.

H. nodulosum var. *tritici*, a new form restricted to *Triticum* and reported from Poona and other districts, is described in detail. In tests involving 35 wheat varieties and hybrids, most introduced varieties and crosses between introduced and local varieties were highly resistant, while most local wheats were highly susceptible. With the exception of Khapli, wheats with high resistance to stem rust were also resistant to this disease.

1909 ROBERTS, D. W. A.
Sawfly resistance in wheat. I. Types of resistance.
Canad. J. agric. Sci. 1954 : **34** : 582–97.

In investigations on the wheats Thatcher, Red Bobs, Rescue, H4191, H46146, Melanopus and Golden Ball, significant varietal differences were found in (1) infestability, (2) resistance to egg development and establishment of first-instar larvae, and (3) resistance to the development of older larvae. These three phases of reaction were affected by environmental factors in different ways. It is suggested that the loci affecting infestability, egg hatchability and survival of the older larvae may in some cases be different. Stem solidity is not a reliable criterion of sawfly resistance, although it may be a factor directly or indirectly involved in resistance.

1910 BACHTHALER, G.
Der Einfluss einer Überdosis 2,4 D- und 2,4,5 T-Unkraut-Bekämpfungsmittel auf verschiedene Winterweizensorten. (**The influence of an overdose of the weed-killers 2,4, D and 2,4,5 T on different varieties of winter wheat**).
Z. PflBau. 1955 : **6** : 40–48.

Varietal differences in damage caused by overdoses of the above two selective weed-killers are recorded.

BUCKWHEAT

1911 MODILEVSJKIĬ, JA. S.
[**The effect of boron upon pollination, fertilization and fruit setting of heterostylous plants such as buckwheat (*Fagopyrum sagittatum* Gilib.)**].
Bot. Ž. (Bot. J.), Kiïv 1953 : **10** : No. **3** : 7–15. [Ukrainian].

The fruit set of illegitimately pollinated buckwheat plants was improved and the percentage of aborted fruits reduced when they were sprayed with boric acid solution. The best results were obtained by spraying with a 0·01% solution at the height of flowering and then again a week and a fortnight later.

OATS

1912 Chapman, W. H.
Floriland oats.
Circ. Fla. agric. Exp. Sta. 1952 : No. S–53 : Pp. 8.

Detailed information is provided on the origin, grain and forage yields, plant characteristics and disease reactions of the new variety Floriland (cf. *PBA*, Vol. XXIII, Abst. 1108).

1913 **A report on three years' experimentation with oat varieties 1951 to 1953.**
Tech. Bull. Edinb. Coll. Agric. 1954 : No. 11 : Pp. 15.

A detailed report is given of the results of trials carried out on Blenda, Minor, Forward, Onward and several other varieties with Sun II as control during 1951–53 in the East of Scotland.

1914 Bell, R. A. M.
Spring oat variety trials, 1946-1953.
J. nat. Inst. agric. Bot. 1954 : **7** : 5–13.

Data on two trial series of ten varieties conducted at 11 regional centres in England and Scotland are given. No variety equalled the controls, Victory and Sun II, in grain or straw yield, but all except Ayr Ally and Aa725 were earlier. The short-strawed varieties Aa725 and Craig's Afterlea showed good resistance to lodging.

1915 Kelly, A. F.
Spring oat variety trials, 1949-1953.
J. nat. Inst. agric. Bot. 1954 : **7** : 14–23.

Trials in which eight varieties were compared with Sun II or Victory are reported from 17 stations in Great Britain. Forward and Express were earlier and D1670 and Gartons' 401 later than Sun II. No variety was superior to Sun II in yield, grain quality or lodging resistance, but all except Flämingstreue and Gartons' 401 were higher yielding than Victory.

1916 Inkilä, O.
Kauran lajikekokeiden tuloksia Jokioisissa. (**Results of oat variety trials at Jokioinen**).
Koetoim. ja Käytäntö 1954 : p. 14.

Several native Finnish and foreign oat varieties were compared in respect of grain yield, strength of straw and maturation period. Yield was greatest in the late varieties such as Sisu [Courage] and Sol II [Sun II]; the latter had the strongest straw. Tammi and Orion III are suited to cultivation in mid and northern Finland on account of their earliness although their yield is lower. The new Danish varieties Rex and Palu are also discussed but no figures are given.

1917 Salonheimo, L.
Kaura suo- ja vaaraviljelyksillä. (**The cultivation of oats on peat and mountain soils**).
Koetoim. ja Käytäntö 1954 : p. 18.

Comparative trials of a number of oat varieties on peat and mountain soils in Karelia are described. The effect of frost and rainfall on yield in different years is mentioned, and data for the yields of a series of Swedish and Finnish varieties on the soil types are briefly discussed.

1918 Eikeland, H. J.
Kva havresortar gjev størst og sikrast kornavling i dei ulike landsdelene? (**What varieties of oats gave the highest and surest grain yields in the different provinces?**)
Norsk Landbr. 1955 : **21** : p. 133.

The Scandinavian varieties Sol II [Sun II], Blenda, Sisu, Gullregn II [Golden Rain II], Blixt [Lightning], Bambu, Voll and Nidar II are briefly described and recommendations based on the results of regional varietal trials are made concerning their suitability for different parts of Norway.

1919 Åkerman, Å.
Svalöfs Segerhavre II. Ny sort av seger-typ. (**Svalöf's Victory oats II. New variety of the Victory type**).
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : p. 4.

A new variety of oats, Seger II [Victory II], is described. Selected from the old form of Segerhavre, henceforth to be designated Seger I, it has stiffer straw and yields 2½% more grain than the parent variety.

1920 Åkerman, Å.
Svalöfs havresorter vid inhemsk odling och export. (**Svalöf oat varieties under conditions of home cultivation and export**).
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : 5–8.

The results of trials in Sweden and Denmark in 1954, in which the Swedish varieties Sol II [Sun II] and Blenda were compared with the Finnish variety Sisu and the Danish variety Rex, are presented. In most localities, Sol II gave approximately the same yields as Sisu and Rex, but its grain was plumper and of a better appearance. Blenda was slightly less productive than Rex and Sisu, but matured earlier. However, the new early variety Blixt

[Lightning], which was released in 1953 (cf. *PBA*, Vol. XXIII, Abst. 167) and is intended to replace Blenda, gave yields comparable with those of the Finnish and Danish varieties.

1921 WIKLUND, K.
Svalöfs original Niphavre. (**The Svalöf original oat Nip**).
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : 9–11.

Nip (Å01600), a new early-maturing black-grained variety selected from the cross Orion II x (Guldregn II [Golden Rain II] x Orion I) is described. It outyields Same and Orion III, the black-grained varieties most widely cultivated in Norrland, by 5–8%; its straw yield is slightly lower than that of Orion III but higher than that of Same. The 1000-grain weight and stiffness of straw of Nip are comparable with those of other varieties grown in the Norrland area. It gives approximately the same yield as Guldregn II but, as it matures nine days earlier than this white-grained variety, it is better adapted to cultivation in Norrland.

1922 Haver, 1955. (**Oats, 1955**).
Landbouwvoorlichting 11 : Bijl. 22; Ber. Rassenkeuze 1954 : No. 174 : unpaginated.

The results of interprovincial trials conducted in the Netherlands in 1954 are reported. On highly fertile soils, Abed Minor and Pendek, both of which are highly resistant to lodging, gave the highest yields. On dry, sandy soils of low fertility, Flämingsgold produced the highest yields of grain and straw, but the quality of its grain was poor. Marne, Libertas and the new variety Civena gave the best results on soils of medium fertility. Civena is described as similar in many respects to Marne, but has smaller grains and longer straw.

1923 ATKINS, I. M. & RIVERS, G. W.
Alamo oats.
Bull. Tex. agric. Exp. Sta. 1954 : No. 778 : Pp. 7.

Alamo [CI4019 (Victoria-Hajira-Banner) x CI3528 (Fulghum-Victoria)], a dual purpose variety highly resistant to the prevailing races of crown and stem rust, has been released for commercial production in Texas. It is early maturing, strong-strawed and particularly well adapted to spring sowing in northern Texas. It bears plump red grain practically free from awns. It is susceptible to *Helminthosporium* blight. Less cold-resistant than Mustang or Red Rustproof strains, it should not be autumn-sown north of the Austin area in central Texas.

1924 JOSHI, A. B. & HOWARD, H. W.
Meiotic irregularities in hexaploid oats. III. Further observations on the frequency of univalents and other meiotic irregularities in spring x winter variety hybrids of *Avena sativa*.
J. agric. Sci. 1955 : **45** : 380–87.

In further investigations the two spring oat varieties Argentine and Victory and the two winter varieties Grey Winter and Black Winter were found to possess 0·10, 0·07, 1·57 and 0·41% pollen mother cells with irregular meioses respectively (cf. *PBA*, Vol. XVII, Abst. 1411 and Vol. XIX, Abst. 250). F_1 Victory x Argentine had 3·43% abnormal meioses and F_1 Grey Winter x Black Winter 1·58%. F_1 Argentine x Grey Winter displayed 28·1% of irregular meioses, F_1 Victory x Grey Winter 31·4%, F_1 Argentine x Black Winter 13·8% and F_1 Victory x Black Winter 14·3%. The most frequent irregularity in the F_1 winter x spring hybrids was the occurrence of 1–5 univalents, the most common number being 2. Some trivalents and quadrivalents were observed but Argentine x Grey Winter was the only hybrid with a fairly high frequency of multivalents. Bridges and fragments were not found in any of the parents or F_1 hybrids. It is suggested that the univalents of the F_1 hybrids are the result of only partial homology of two or more chromosomes in the winter and spring types. Of the 29 F_2 plants examined, from Argentine x Grey Winter, 27 had $2n = 42$, one $2n = 41$ and another $2n = 43$. The 42-chromosome plants were classified into 12 individuals with regular meiosis, 8 with an intermediate degree of irregularity and 7 as meiotically irregular as the F_1. As in the F_1, the occurrence of 2 univalents was the chief abnormality. Inversion bridges with fragments were observed in 4 F_2 individuals at anaphase I; one plant had a high frequency of trivalents and in another quadrivalents were recorded. The bearing of these results on the origin of winter and spring types of *A. sativa* and on the possibility of instability of varieties bred from winter x spring combinations is briefly discussed.

1925 COSTA-RODRIGUES, L.
Chromosomal aberrations in oats, *Avena sativa* L.
Agron. lusit. 1954 : **16** : 49–65.

By irradiating florets of *A. sativa* 'Missouri 04047' prior to anthesis with a dose of 300 r., 20 monosomics were obtained in the X_2 from an X_1 generation consisting of 279 plants. The frequencies of different nullisomics in five progenies obtained from monosomic plants ranged from 2·1 to 46·0%. The nullisomics frequently showed partial asynapsis. In monosomics the univalents lagged, forming micronuclei; division of univalents occurred at anaphase I or II. Morphological comparison of monosomic, nullisomic and normal plants is difficult on account of the marked effect of seasonal conditions upon the expression of their characteristics.

1926 Kozaki, M. & Ootsuka [Otsuka], T.
(Studies on the differentiation of the flower buds in oats. I. The relation between sowing time and the time of flower-bud differentiation).
Miyazaki Daigaku Jiho (Shizenkagaku)/Bull. Miyazaki Univ. (Nat. Sci.) 1953 : No. 4 : 47–55. [Japanese].

The date of the differentiation of the flower buds was studied in representatives of *Avena sterilis*, *A. barbata*, *A. strigosa*, *A. fatua* and five varieties of *A. sativa* sown on a series of different dates. In general, differentiation occurred early in the early types and conversely in the late forms.

1927 Nishiyama, I.
Cytogenetic studies in *Avena*, VI. Genetic investigations of monosomic steriloids.
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 57–65.

The so-called steriloid mutants, showing an intermediate type of floret base, were discovered in the F_3 of $3n$ hybrids between *A. barbata* ($2n = 28$) with an articulated base and *A. strigosa* ($2n = 14$) with a solid base. The mutants had either $2n = 28$ or 27 chromosomes. Previous investigations indicated that the $2n = 28$ type segregates in a 1 : 1 ratio for the intermediate and articulated types, with occasional plants having a nonarticulated base. The origin of the $2n = 28$ steriloid was assumed to be due to a chromosome constitution of $a_5a'_5\alpha_1\alpha_2/a_1a_1\alpha_1\alpha_2$ instead of the normal one of $a_5a'_5\beta_1\beta_2/a_5a'_5\beta_1\beta_2$ for *A. barbata*. Chromosome a'_5 is associated with the articulated type and the β chromosomes have a modifying effect upon the expression of this character. The β and a'_5 chromosomes are members of the B′ genome of *A. barbata*; a_5 and α, belonging to the A genome of *A. barbata* or of *A. strigosa*, are homologous or partly homologous with a'_5 and β respectively, and determine the production of a solid base. The present paper deals in detail with the monosomic type, which was found to be without one a'_5 chromosome and to segregate in a ratio of approximately 2 : 1 for steriloids and plants with an articulated base. This type is assumed to have the formula $a_5a'_5\alpha_1\alpha_2/a_5\alpha_1\alpha_2$: Usually the steriloid segregates had 27 chromosomes and the articulated individuals 28. Certation between pollen grains with 13 and 14 chromosomes occurred at the rate of 1 : 4 respectively. Pubescence on the dorsal surface of the lemma was closely associated with base type. A few segregates showing exceptional combinations of chromosome number, base type and lemma pubescence probably arose as the result of the aberrant assortment of a_5 and a'_5 in meiosis or of crossing-over between these chromosomes.

1928 Stuke, H.
Eine Schnellmethode zur Bestimmung des Spelzengehaltes beim Hafer. **(A rapid method of determining the husk content of oats).**
Züchter 1955 : **25** : 90–92.

An apparatus that removes the glumes from oats is described. It is in use at the Plant Breeding Institute, Halle-Wittenberg, Germany, where it has proved of value in determining the husk content of samples of oats.

1929 Hutchinson, J. B., Kent, N. L. & Martin, H. F.
Oat kernels with decayed embryos: a factor in the germination capacity of oats.
J. nat. Inst. agric. Bot. 1954 : **7** : 24–32.

The incidence of embryo and endosperm decay in oat kernels appears to be more closely related to environmental than to varietal factors, but some resistance has been shown by winter oats and by the spring varieties Black Supreme, Onward, Star and Eagle. The damage is thought to occur prior to harvesting but its cause is unknown.

1930 Kumagai, T.
(Studies on hygrotype and xerotype oats. II. The effect of the amount of soil water before heading on the growth and yield of oats).
Hokkaido Nogyo Shikenjo Iho/Res. Bull. Hokkaido agric. Exp. Sta. 1954 : No. 67 : 48–54. [Japanese].

The developmental patterns of the varieties Black Mesdag, Victory 1 and Kytö were compared under three different sets of conditions prior to heading: (1) arid; (2) normal; and (3) wet. Ear length, ear weight and grain yield decreased with fall in moisture in all varieties, but least in Kytö. The 1000-grain weight of Victory increased as moisture dropped, but in the other varieties was little affected.

1931 Coffman, F. A.
Results from uniform winter hardiness nurseries of oats for the five years 1947 to 1951, inclusive.
Agron. J. 1955 : **47** : 54–57.

Additional data from tests carried out in the USA during the period 1947–51 substantiate the results obtained during the previous 20 years (cf. *PBA*, Vol. XVIII, Abst. 874). Wintok appears to be the most winter-hardy variety, followed by Fulwin. Breeding for a combination of hardiness and disease resistance has proved to be difficult, since genes for disease resistance are largely restricted to oats of the spring type. Letoria (Lee x Victoria), however, has survived as well as its hardy parent Lee and has also shown disease resistance.

1932 Simons, M. D., Peturson, B. & Murphy, H. C.
Purification of differential oat varieties for identification of races of crown rust).
Plant Dis. Reptr. 1955 : **39** : 23–24. (Mimeographed).

In view of the known genetic impurity of the ten differentials Anthony, Victoria, Appler, Bond, Landhafer, Santa Fe, Ukraine, Trispernia, Bondvic and Saia, the authors have undertaken to establish and increase pure lines to serve as foundation stocks for use by investigators throughout the world.

1933 Huffman, M. D.
Testing for resistance to the *Septoria* disease of oats.
Plant Dis. Reptr. 1955 : **39** : 25–28. (Mimeographed).

Methods of inoculation used at the Iowa Agricultural Experiment Station in testing the CI oat collection for reaction to *S. avenae* are described. Several selections showing more resistance than any of the commercial varieties now distributed in the north central states have been discovered; their value as sources of resistance in breeding is to be determined.

RYE

1934 Bell, R. A. M.
Winter rye variety trials, 1947-1950.
J. nat. Inst. agric. Bot. 1954 : **7** : 80–86.

In 12 trials carried out at four English stations, four short-strawed continental varieties proved superior to three long-strawed English varieties in grain yield and resistance to lodging, Petkus and Pearl giving the best yields. The native strains were of earlier and more rapid spring growth.

1935 Frimmel, F. & Hruška, L.
Heterosis a její využití ve šlechtění. (**Heterosis and its utilization in breeding**).
Za socialist. Zeměd. 1955 : No. 3 : 129–38.

Methods of obtaining higher yields in both self-pollinated and cross-pollinated crop plants are discussed. Recent achievements in Czechoslovakia include the production of rye and spinach hybrids giving higher yields than either of the parent varieties. The rye hybrids were obtained by restricted open pollination. Some of the spinach hybrids outyielded the more productive parent by 15·9–27·5%.

1936 Krasnjuk, A. A.
(**Breeding and seed production of winter rye**).
Zemledelie (Agriculture) 1955 : No. 1 : 80–89. [Russian].

At Saratov, the yield, 1000 seed weight and grain-setting ability of Volžanka [Volga] have been improved by selection, and a new variety that surpasses it in yield and produces larger grain has been developed. The new rye is a population, comprising selected families from unspecified crosses between Volžanka and some large-grained varieties. In preliminary trials it outyielded the ryes Harjkov 194 and Lisicyna [Lisicyn's] in the Belgorod province and Volžanka in some districts of the Saratov province.

1937 Oehler, E.
Nouvelles voies dans la sélection du seigle. (**New ways of breeding rye**).
Rev. rom. Agric. 1955 : **11** : 1–2.

This popular account of rye breeding commences with an historical description of the cultivation of this cereal; at the present time, Petkus is the variety most widely grown in western and central Europe. At the Agricultural Research Station, Lausanne, Switzerland, vegetative propagation has resulted in populations of identical genetic constitution, and these clones have proved valuable in selection work. Some self-fertile lines have also been selected and, although inbreeding over a number of generations leads to loss of vigour, crosses and double-crosses have been effected which have given rise to productive self-fertile strains. The development of tetraploid forms of Petkus, Stål [Steel] and Rothenbrunnen in Germany, Sweden and Switzerland, respectively, is also described; rigorous selection within these tetraploid varieties should result in their outyielding the diploid forms by a considerable margin.

1938 MESSEDAGLIA, L.
Per la storia delle nostre piante alimentari. La segala. (**The history of our food plants. Rye**).
Ann. Accad. Agric. Torino 1952–53 : **95** : 25–42.

In examining the literature dealing with the history of rye certain errors of interpretation are pointed out; for instance the *siligo* of Columella and other Roman writers was originally a form of fine bread wheat and only later became identified with *secale*, the *granada* or *granata* of northern Italy was a mixture of rye with wheat and the *misiligo* was a mixture of millet with rye.

1939 BRESLAVEC, L. P.
(**A comparative cytological study of the effect of low doses of X-ray and radium irradiation upon germinating grains of spring rye**).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1954 : No. 6 : 38–51. [Russian].

Even low doses of irradiation caused some forms of cell injury, such as a high degree of vacuolization of the protoplasm, chromosome fragmentation or formation of micronuclei. These cell changes increased as irradiation was intensified from 25 to 800 r. Low doses of irradiation either accelerated or retarded the growth of the roots, coleoptiles and leaves of the young plants, a dose of about 50 r. given at a moderate rate over a long period being the most effective one for stimulating growth of the plants and for increasing the size of the cells and nuclei. Formation of large cells and nuclei was observed when the plants were exposed to radium irradiation for 24 hours. A greater number of large cells was obtained when the plants were placed at some distance from the source of irradiation.

1940 LIMA-DE-FARIA, A.
Structure and behaviour of a chromosome derivative with a deleted kinetochore.
Chromosoma 1955 : **7** : 51–77.

A chromosome derivative with a partly deleted centromere, found in a rye plant, was investigated with respect to its behaviour during meiosis and also metaphase of root-tip mitosis. At pachytene, the centromere was approximately one-third the length of the normal centromere. It consisted of a weakly stained fibrilla pair and a chromomere pair, considered to be one half of the distal zone and one half of the median region of the normal centromere, respectively (cf. Abst. 1941). The chromosome derivative had the same ability to move to the spindle poles as a chromosome with a complete centromere; it showed a normal capacity to locate itself in the mitotic metaphase plate and divided regularly at meiosis I, elimination and nondisjunction seldom occurring. It also underwent very little elimination at meiosis II. Its condensation cycle, however, differed from that of a normal chromosome, the derivative being approximately 16 times smaller at pachytene but at metaphase II only three times smaller. During pachytene the chromosome derivative split into sister chromatids earlier than bivalents of normal chromosomes but its chromatids did not separate until mid-anaphase I. Crossing-over involving the centromere and one arm may account for the formation of derivatives possessing an incomplete centromere.

1941 LIMA-DE-FARIA, A.
Structural differentiation of the kinetochore in rye and *Agapanthus*.
Chromosoma 1955 : **7** : 78–89.

The centromere in rye was found to consist of a pair of deeply stained fibrillae flanked on either side by a pair of chromomeres followed by a pair of almost unstained fibrillae. The two pairs of weakly stained fibrillae, the two chromomere pairs and the pair of deeply stained fibrillae constitute the distal, median and central zones respectively. Further investigation revealed that the central zone is composed of one or two pairs of smaller chromomeres. The structure of the centromere of *A. umbellatus* is essentially similar to that of the centromere in rye but the chromomere pairs differ in size and the two partners of each chromomere pair are less intimately associated than in rye.

1942 NAKAJIMA, G.
(**Autotetraploid rye produced by the colchicine method**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **4** : No. 1 : 41–45. [Japanese.]

A description of a stock of tetraploid rye produced by the author using colchicine is given. The increase in kernel weight of the tetraploids was 43·77%; stem length, however, was reduced. Meiosis was fairly regular but fertility was depressed.

MAIZE

1943 Mais, 1955. (**Maize, 1955**).
Landbouwvoorlichting **12** : Bijl. 6; Ber. Rassenkeuze 1955 : No. 185 : unpaginated.

Data on yield, maturity, shape and colour of the grain, straw strength and resistance to diseases of a number of Netherlands and American hybrids are presented. In trials conducted on different types of soil in the Netherlands, Matador, Prior and CIV5 gave the highest yields in the early, medium early and medium late groups respectively. Yields among the late varieties varied considerably according to locality and type of soil, KE3 producing the highest yields on clay soils, Amdrie on alluvial soils and KF1 on the sandy soils in the south-east of the Netherlands.

1944 JUGENHEIMER, R. W.
Hybrid corn development in Europe and Mediterranean countries.
Agron. J. 1955 : **47** : 5–7.

Progress in the hybrid maize programme carried out in 25 European and Mediterranean countries under the auspices of FAO, the Organization for European Economic Cooperation and Foreign Operations Administration of the USA is outlined.

1945 BUCHINGER, A.
Wir bauen Hybridmais. (**We are growing hybrid maize**).
Bundesmin. Land- u. Forstw., Wien [undated] : Pp. 15.

An account of the development of hybrid maize in the USA is given and its advantages over maize varieties are listed. As yet all hybrid seed sown in Austria is imported but it is hoped soon to develop locally-adapted hybrids.

1946 BERTOCCHI, I.
Punte maidicole nel 1954. (**Record maize yields in 1954**).
Agric. bresciano 1955 : **3** : No. **8** : p. 1.

Yields of 131·75 q. per ha. have now been reached with hybrid maize in Italy.

1947 FENAROLI, L.
Il cammino degli ibridi di mais in Italia. (**The path of hybrid maize in Italy**).
Ital. agric. 1955 : **92** : 96–98.

A map is presented, together with tabular data, showing the rise in the area planted with hybrid maize in different parts of Italy from 1948 to 1954. It is calculated that hybrid maize added some 17 million lire to the national income in 1954 alone. Italy is now exporting hybrid maize seed to the USA.

1948 EMILJJANOV, I.
(**Using hybrid seed for sowing maize**).
Kolhoz. Proizvod. (Collect. Fm. Prod.) 1955: No. **3** : 21–23. [Russian].

High-yielding intervarietal hybrids, top crosses and double crosses bred in recent years in the USSR are listed. The double crosses originating from the Institute of Plant Industry have vigorous root systems and show resistance to lodging and diseases. Their yields are considerably higher than those of the top crosses and intervarietal hybrids. Notes on the production of double crosses such as VIR 42 [Institute of Plant Industry 42] are given. Mention is made of a multiple hybrid population developed at Krasnodar which outyields Sterling by a good margin and produces undiminished yields for several generations. Recent state trials have shown that the thesis that hybrid vigour can be maintained for many years by selection is unjustified.

1949 **Hybrid maize in Egypt.**
World Crops 1955 : **7** : 166–67.

Breeding and testing work on hybrid maize, carried out in Egypt since 1949, is outlined. The average increase in yield obtained from the most promising of the hybrids tested has amounted to approximately 30%. The production of seed of both local and imported double crosses is under way. Other investigations include the development of cytoplasmic male-sterile lines and analysis of the inheritance of borer resistance in a Minnesota inbred by means of translocation stocks.

1950 RATTRAY, A.
Maize the foundation. Production and influence of hybrid.
Rhod. Fmr. Yearb. 1953 : 66–67.

The history of maize breeding in Southern Rhodesia since 1932 is outlined and the current aim of producing locally adapted hybrids with resistance to disease and lodging is discussed.

1951 **1953/54 maize investigations.**
Nyasald. Fmr. Forester 1954 : **2** : No. 3 : 8–12.

Inbred strains of local stocks were used in the following ways in breeding in Nyasaland: (1) two strains were each crossed with the open-pollinated variety Namalenga; (2) "two separate combinations of a number of inbreds and a number of top crosses were allowed to cross with one another to produce synthetic varieties"; and (3) inbreds were crossed to give single hybrids for the possible production of double hybrids. In all combinations particular attention was paid to keeping quality as represented by medium flinty grain and an ear well covered at the tip by the husks. If satisfactory, the top crosses obtained from crossing (1) will be intercrossed to give double top-cross seed for issue to growers. It is hoped that the synthetics produced by method (2) will be suitable for

Native Trust Land as it would be possible to use the seed from year to year.

Hybrids from Southern Rhodesia again showed susceptibility to *Puccinia polysora* whereas local types were hardly affected.

1952 FINDLEY, W. R. (JUN.)
Report of the Eighth Northeastern Corn Improvement Conference, New York City, January 30-31, 1953.
Div. Cereal Crops Dis., Bur. Pl. Indust. Soils agric. Engin., Pl. Indust. Sta. Beltsville, Md. 1953 : Pp. 30. (Mimeographed).

The performances of WF9 x 38–11 seed from eight sources were compared by J. C. Anderson and J. E. Baylor.

G. H. Stringfield described the differential response of hybrids to varying levels of soil fertility.

D. F. Jones gave an account of work on cytoplasmic pollen sterility. Different sources of sterility vary in their behaviour in crosses. All sterile lines converted to uniform types by back-crossing in successive generations have produced a small percentage of plants showing partial fertility; this is thought to be the result of cytoplasmic variation or of mutation.

The effects of different media, inoculation with various pathogens, temperature and length of incubation period on the germination of six hybrids are described by W. L. Haltiwanger, C. C. Wernham and L. L. Huber.

C. C. Wernham showed that inbred lines of intermediate resistance to blight (*Helminthosporium turcicum*) or complete susceptibility may be successfully used in breeding for blight resistance if crossed with more highly resistant lines. Crosses of the type (R x S)R^1 or (R x S)R produced higher numbers of resistant hybrids than (R x S) selfed. A suggested breeding programme for the mass production of blight-resistant maize was outlined.

A selected strain of tetraploid maize obtained by heat treatment of combinations of inbred lines of Luces Favorite, Illinois A, Webbers Dent and Spanish Flint was described by L. A. Randolph. It is of good fertility and has increased in cytological stability during the past ten years; the plants are sturdier and stiffer-strawed and have larger ears and kernels of higher nutritional value than their parthenogenetic diploid sibs.

Committee reports on uniform tests of double crosses, single crosses and inbred field maize, and on sweet corn investigations were presented. The progress of the establishment of collections of indigenous and introduced strains was discussed.

1953 CRANE, P. L., REMMENGA, E. E., NEWMAN, J. E. & MILES, S. R.
Performance of dent corn hybrids in Indiana, 1950-1954.
Sta. Bull. Purdue agric. Exp. Sta. 1954 : No. 614 : Pp. 20.

The results of trials conducted at ten stations are presented in tables showing the yield, moisture content on harvesting, percentage of broken plants and degree of root lodging of each of the numerous hybrids tested.

1954 **Corn hybrids and varieties. 1952 tests in Mississippi.**
Bull. Miss. agric. Exp. Sta. 1953 : No. 498 : Pp. 16.

Corn hybrids and varieties. 1953 tests in Mississippi.
Bull. Miss. agric. Exp. Sta. 1954 : No. 510 : Pp. 18.

The results of trials on maize hybrids and varieties in different parts of Mississippi are reported.

1955 MCAFEE, T. E. & ROGERS, J. S.
Corn hybrids for Texas.
Bull. Tex. agric. Exp. Sta. 1954 : No. 776 : Pp. 10.

Information is given on the yielding capacity and other characters of maize hybrids and varieties tested at different centres in Texas during the period 1951–53. The recommended yellow hybrids Texas 26, 28 and 30 and the white hybrids TRF 3 and Texas 15W are described.

1956 RIEDL, W. A., RINCKER, C. M. & QUAYLE, W. L.
Hybrid corn adaptation trials in Wyoming for 1947-1950.
Bull. Wyo. agric. Exp. Sta. 1951 : No. 306 : Pp. 14.

The results of tests of maize hybrids at several centres in Wyoming during 1947–50 are summarized.

1957 BOCANEGRA S., S.
El híbrido LM No. 3. (**Hybrid LM No. 3**).
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1953 : **2** : No. **2** : 2–5.

The hybrid La Molina No. 3, which is here described, is a cross of selfed line No. 3 (from Estrella) x selfed line No. 1 (from Santa Clara); it is a yellow flint type, bears two ears per plant and has given yields of grain from 15 to 48% greater than Fumagalli, the standard variety for Peru.

1958 JUAREZ GALIANO, L.
Algunos resultados del maíz híbrido, LM No. 3. (**Some results with hybrid maize LM No. 3**).
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1953 : **3** : No. 4 : 13–17.

Hybrid LM No. 3 (cf. Abst. 1957) yielded 7051 kg. of grain per ha. in tests in Peru in 1952, having beaten all other hybrids, local and imported, and exceeded the standard variety Colombiano Fumagalli by 49%. It was also classed as high in grain quality. Top crosses of No. 3 x Colombiano Fumagalli have also given good results as regards both yield and quality.

1959 NEAL, N. P. & STROMMEN, A. M.
Wisconsin corn hybrids.
Bull. Wis. Agric. Exp. Sta. 1955 : No. 476 : Suppl. : Pp. 16.

Information is given on trials carried out on maize hybrids during 1953 and 1954 (cf. *PBA*, Vol. XXII, Abst. 343). In 1954, the three-way hybrids W313, W353, W413, W453, W513 and W613 and the double crosses W335A, W435 and W642 were released for commercial seed production. In time taken to reach maturity, these hybrids range from 90 to 117 days. They show improvements in various characters, such as standing capacity, resistance to stalk rot, ease of husking or uniformity. Production of seed of two male-sterile hybrids, W464A and W525A, has been undertaken for blending with seed from fertile counterparts.

1960 BUCHINGER, A.
Maisversuche 1952. (**Maize trials 1952**).
Bodenkultur 1953 : Sonderheft 4 : 86–94.

Tabulated data on the results of trials of maize for grain, silage and forage purposes are presented. The trials, which demonstrated the superiority of American hybrids over local Austrian varieties, were conducted at various centres in Upper Austria, Carinthia, Styria and the Tyrol and provided valuable information on the American hybrid varieties most suitable for cultivation in different parts of the country. Several Hungarian hybrids recently introduced into Austria produced grain of an exceptionally high quality.

1961 WEAVER, H. L.
A comparative study of procambium initiation in hybrid and inbred maize.
Amer. J. Bot. 1955 : **42** : 105–08.

An anatomical study of the shoot apices of 10 yellow dent inbreds and 39 single crosses involving these inbreds is reported. No significant differences between inbreds or between inbreds as a whole and hybrids in respect of the distance of the locus of procambium differentiation from the stem apex could be detected. Differences were noted however both between varieties and between varieties and hybrids in the plastochronic phase of the plants at the time of sampling.

1962 RAMÍREZ C., M. A.
Influencia de la selección en S_0 en maíz. (**Influence of selection in open-pollinated varieties in maize**).
Acta agron. 1954 : **4** : 203–17.

A study was made on the height of insertion of the ear, the distance from the ear to the tassel, the number of leaves above the ear and the angle between the leaves and stem in three open-pollinated Colombian maize varieties and their selfed progenies. In general the values for all characters were lower in the S_1 than in the S_0, though in certain S_1 lines of the variety Blanco Común [Common White] the insertion of the ear was however higher. A significant positive correlation was observed between the S_0 and S_1 values for all four characters; a positive correlation was established between height of ear and base of tassel, the coefficient of correlation being higher in the S_1 generation than in S_0; height of ear was also correlated with leaf angle in S_0 but not in S_1; leaf number was negatively correlated with angle of insertion. No correlation was detected between any of the other characters studied.

The reduction in the values is considered to be the result of loss of vigour from inbreeding.

1963 ROUX, E. R.
Maize in Africa before Columbus.
S. Afr. J. Sci. 1954 : **51** : p. 31.

Jeffreys' theory of the presence of maize in Africa in the pre-Columbian era (cf. *PBA*, Vol. XXIV, Abst. 307) is criticized on the grounds that the terms regarded as pertaining to maize might have been meant for sorghum and that maize appears to have been regarded as a novelty in Spain in 1494.

1964 GOODWIN, A. J. H.
Maize in Africa.
S. Afr. J. Sci. 1954 : **51** : 31–32.

It is stated that fully adequate grounds for accepting Jeffreys' theory of a pre-Columbian origin for maize (cf. *PBA*, Vol. XXIV, Abst. 307) can only be provided by discovering actual plant remains or by unambiguous descriptions or representations.

1965 Jeffreys, M. D. W.
A reply to Dr. Roux and Mr. Goodwin.
S. Afr. J. Sci. 1954 : **51** : 32–33.

Replying to criticisms of his theory of the presence of maize in Africa in pre-Columbian times (cf. Absts. 1963 and 1964), the author points out that confused nomenclature does not disprove that two or more quite distinct plants might be involved. Reference is made to a Portuguese tradition that maize was brought from Guinea to Portugal in the reign of João II who died in 1495.

1966 Goodwin, A. J. H.
Maize.
S. Afr. J. Sci. 1954 : **51** : p. 142.

In reply to Jeffreys' recent remarks on maize in pre-Columbian Africa (cf. Abst. 1965), the need for decisive factual evidence is reiterated.

1967 Konzak, C. F.
The influence of oxygen tension on the genetic effects of X-rays.
Radiation Res. 1954 : **1** : 501–02. (Abst.).

In experiments on maize, mutations at the loci a_1, sh_2 and pr were induced by irradiation of the pollen from a tester stock possessing the corresponding dominant alleles. Irradiation in pure oxygen as compared with air caused no significant change in the mutation frequency. Irradiation in nitrogen, however, resulted in 62% reduction in the overall frequency of mutation, the reduction in the frequency of mutations affecting the entire seed being significantly greater than that in the case of mosaics. Assuming that mutations affecting the entire endosperm chiefly represent chromosome breaks or deletions whereas mosaics are mostly the result of chromatid aberrations, oxygen apparently plays an active role in the production of chromosome breaks.

1968 Zaharova, G. M.
(**The inheritance of characters in maize and tomato plants pollinated with mixed pollen**).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1955 : No. 1 : 32–44. [Russian].

The results of investigations, conducted by the Institute of Genetics, on the effect of multiparental pollination of maize and tomato plants are reported. When two varieties were used as pollinators, some of the F_1 progeny inherited characters from both the ♂ parents; in other cases the effect of one of the ♂ parents did not become apparent until the F_2. It is also suggested that multiparental pollination may shatter the inheritance of the plant, and data on segregation ratios in the F_1 are put forward to support this hypothesis. Some of the characters observed in the F_1 of multiparental hybrids disappeared in succeeding generations.

1969 **Field crop varieties in Wisconsin.**
Circ. Wis. agric. Exp. Sta. 1954 : No. 463 : Pp. 8.

Descriptive notes are given on varieties of cereals, lucerne, red clover, Sudan grass, flax and soya bean grown in Wisconsin. Maize hybrids produced by using male-sterile inbreds are now available for commercial use.

1970 Hubbard, J. E. & Leng, E. R.
Leaf number in mature embryos of inbred lines of dent maize.
Agron. J. 1955 : **47** : 40–42.

The mature embryos of the 14 inbred lines investigated contained in most cases five differentiated leaves. No association was found between the total number of leaves produced by the mature plant or number of days to the "half-silk" stage. A significant positive correlation was obtained between embryo leaf-number and kernel weight.

1971 Velasco Hernández, R.
Diferencias en el rendimiento al beneficio industrial de variedades venezolanas de maíz. (**Differences in yield on industrial utilization of Venezuelan varieties of maize**).
Agron. trop. Venezuela 1954 : **3** : 251–63.

Observations on three varieties failed to reveal any significant differences or to substantiate the popular belief that the variety Sicarigua is inferior in quality when subjected to the Venezuelan practice of hulling the grain for the production of the local bread *arepa*.

1972 Kišpatić, J. & Lušin, V.
Prašna snijet kukuruza. (**Head smut of maize**).
Zaštita Bilja 1954 : No. 25 : 3–17.

Recent infection trials confirm previous findings that the maizes of the Osmak type show a higher degree of resistance to *Sorosporium reilianum* than other varieties and hybrids (cf. *PBA*, Vol. XXIII, Abst. 1174).

1973 Ellis, R. T.
Tolerance to the maize rust *Puccinia polysora* Underw.
Nature, Lond. 1954 : **174** : p. 1021.

The reactions of (1) an introduced maize hybrid, (2) a locally selected open-pollinated variety and (3) an unselected local native maize to *P. polysora* were investigated at the Agricultural Research Station, Lilongwe, Nyasaland. In unsprayed plots, varieties (1), (2) and (3) had average scores of 3·5, 1·9 and 1·6 for number of open uredosori, respectively. The yield of the hybrid was however reduced by 17% whereas the yields of the two local varieties were unaffected. Differences in varietal susceptibility and tolerance therefore exist, although all three types gave the fully susceptible reaction when tested for juvenile resistance in the greenhouse. The local varieties yielded much less than the hybrid even when the latter was fully attacked by rust. It is postulated that the local varieties do not express in their grain yield the full capabilities of their metabolism; they were thus able to withstand the degree of infection in question without loss in yield.

1974 KOEHLER, B.
Correlation between resistance to Stewart's leaf blight and Northern leaf blight in corn.
Plant Dis. Reptr. 1955 : **39** : 164–65.

Maize lines bred for resistance to *Helminthosporium turcicum* by outcrossing and backcrossing techniques showed a simultaneous improvement in resistance to *Bacterium stewarti.*

BARLEY

1975 BUCHLI, M.
Die Sommergerstensorten des schweizerischen Richtsortimentes für den Getreidebau 1954. (**The spring barley varieties of the Swiss approved variety collection for cereal cultivation, 1954**).
Flugbl. Landw. VersAnst. Zürich-Oerlikon 1954 : No. A/6 : Pp. 4.

Full data are presented on the varieties Isaria, Kenia, Freja and Herta, all four of which are included in the Swiss list of varieties approved for 1954.

1976 FRÖIER, K.
Aktuella växtförädlingsuppgifter i samband med kornodlingens utökning. (**Plant breeding tasks of the moment in connexion with the increase in barley growing**).
Svensk JordbrForsk. Årsb. 1954 : 85–91.

Reasons for the marked increase in the barley acreage in Sweden are examined. The breeder must follow this trend by the production of varieties, suitable as regards straw and dates of ripening, to facilitate the farmer's use of his own or cooperatively owned machinery for harvesting and drying in localities where a distribution of labour may prove necessary.

Varietal differentiation in earliness is receiving attention in the Swedish Seed Association's breeding programme, as is also resistance to various diseases and pests that may appear as a consequence of the rotation changes involved in increased barley production.

1977 HAMILTON, D. G.
Better barleys for Canada.
Cereal News 1955 : **2** : 5–8.

The current barley breeding programme in Canada includes the development of improved six-rowed varieties for malting or fodder, backcrossing and pedigree procedures being the chief techniques employed. The widespread need for loose-smut resistant barleys is stressed and the particular characters required in individual areas are mentioned.

1978 MOH, C. C. & NILAN, R. A.
"Short" chromosome—a mutant in barley induced by atomic bomb irradiation.
Cytologia, Tokyo 1954 : **19** : 48–53.

A mutant showing meiotic abnormalities, of which the chief is the extreme condensation of the chromosomes at diakinesis, was obtained from a population of the variety Trebi exposed to atom bomb radiation at Bikini in 1946. The mutant depends upon a single recessive factor, *sc.* Various numbers of univalents are formed at diakinesis, probably as the result of precocious separation of bivalents. Aneuploid and tetraploid microcytes are also among the abnormalities observed. At pachytene the chromosomes are distinctly spread apart; the mutant is thus useful material for the study of chromosome aberrations. Three types of irregularities have been induced by treating seeds homozygous for *sc*: a reciprocal translocation, rings and a possible deficiency. The mutant is pollen sterile; under conditions of open pollination it gave 14·5% seed set.

1979 BURNHAM, C. R., WHITE, F. H. & LIVERS, R.
Chromosomal interchanges in barley.
Cytologia, Tokyo 1954 : **19** : 191–202.

By X irradiation of seeds of *Hordeum vulgare* 'Mars', 34 chromosomal-interchange lines have been obtained. Pollen abortion in plants with one ring ranged in different lines from 14 to 58%, with an average of 28·8%. Stocks homozygous for a particular interchange have been established for 28 of the lines. The use of a tester set of five interchanges in identifying the chromosomes involved in new interchanges is illustrated. The chromosomes have been provisionally designated a to g, the testers being a–b, b–d, c–e, e–f and c–d interchanges. Trisomics were identified in the progenies of plants heterozygous for certain of the interchanges, a chain of five chromosomes being observed instead of a ring of four. From their progenies, it should be possible to select stocks of primary trisomics. Chromosome g was found to carry the large satellite, the conclusion of Hagberg and Tjio thus being confirmed (cf. *PBA*, Vol. XXII, Abst. 1912). Linkage tests revealed that chromosome e carries group IV; f, V; and b, III.

1980 KERBER, E. R.
Trisomics in barley.
Science 1954 : **120** : 808–09.

Trisomic plants have been found in the progeny of three triploids obtained in the F_2 from colchicine-treated F_1 intervarietal hybrids at the Department of Plant Science, University of Alberta. The fertility of the trisomics, including a few heads pollinated with normal pollen of diploids, ranged from 20·4 to 66·7%. The progenies of the trisomics are to be studied and identification of the extra chromosomes is to be attempted.

1981 TSUCHIYA, T.
Fertility of autotetraploids and their hybrids in barley, I. Meiosis and fertility in some autotetraploids.
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 46–52.

Investigations were carried out on $2n$ and $4n$ forms of *Hordeum sativum* 'Early Golden Melon' and 'Hosokara 2' and of *H. spontaneum* var. *nigrum*. The diploids exhibited regular meiosis and were highly fertile. At metaphase I in the $4n$ forms, 7_{IV} or configurations consisting of various numbers of quadrivalents, trivalents, bivalents and univalents were produced. Of the different quadrivalent associations formed, the zigzag and open-ring types were the most frequent. Laggards and bridges at anaphase and telophase I and II, micronuclei, and sporocytes and quartets with abnormal numbers of cells were observed. The diploids had higher pollen and seed fertility than the tetraploids. The higher seed fertility of $4n$ Early Golden Melon, compared with the other two tetraploids, is partly ascribed to the lower frequencies of univalents and quadrivalents per sporocyte and of sporocytes with univalents in this variety.

1982 YAMAMOTO, Y.
(**Physiological studies on barley polyploids**).
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 117–19. [Japanese].

Diploid and tetraploid strains of three two-rowed and two six-rowed varieties were compared in respect of germination percentage, vegetative period, fertility, economic characteristics of the stem, ear and grain, and enzymatic activity. The tetraploids had shorter and stiffer culms and a somewhat higher amylytic and proteolytic activity; they were much less fertile than the diploids.

1983 SAKAI, K.–I., & SUZUKI, Y.
Studies on competition in plants. II. Competition between diploid and autotetraploid plants of barley.
J. Genet. 1955 : **53** : 11–20.

Using seven varieties, investigations were carried out on the competitive ability of the autotetraploids against the diploids by means of (1) hexagonally arranged sowings in which one $2n$ or $4n$ plant was surrounded by either six diploids or six tetraploids of the same variety, and (2) rows in which the competing plants were sown in alternate hills in the rows. Individual plant data were obtained, chiefly on dry weight, culm number, head number and weight of heads. Except in the case of one variety, the autotetraploids did not compete well against the diploids. Investigations on reproductive ability showed that the number of seeds produced by the $4n$ form in pure stand was approximately 47% of that yielded by its diploid progenitor and that the number of seeds obtained from a $4n$ individual surrounded by six diploids was reduced to about 17%. Experiments were also carried out on the competitive ability of the $2n$ and $4n$ races of the seven varieties against a common diploid tester. The competitive ability of some $4n$ forms exceeded that of the tester. It was also found that the competitive ability of a $4n$ race corresponded to that of its diploid ancestor.

1984 TSUCHIYA, T.
Cytogenetic investigations of twin plants found in a tetraploid barley hybrid.
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 53–56.

Twin plants were discovered in the F_2 of a hybrid between $4n$ *Hordeum sativum* var. *distichum* 'Early Golden Melon' and $4n$ *H. spontaneum* var. *nigrum*. One plant, T28–1, was large, resembling the F_1 hybrid, whereas the other, T28–2, was small. Cytological investigations indicated that T28–1 was a true tetraploid ($2n = 28$), with the chromosome formula of 4(abcdefg), but that T28–2 lacked one pair of g chromosomes. T28–1 and T28–2 had 95·28 and 81·70% pollen fertility and 75·00% and 13·04% seed fertility, respectively. It was noted that in T28–2 pollen-grain abnormalities were more frequent.

1985 Wilten, W.
Opbrengsten, rassenstatistiek en raseigenschappen van zomergerst. (**Yields, varietal statistics and varietal characteristics of spring barley**).
19de Nacobrouw Jb. 1955 : 104–13.

Tabulated data on the comparative yields, period to maturity, length and stiffness of the straw, average number of grains per ear, grain size and quality, susceptibility to diseases and shattering and adaptability to different types of soil are presented for the principal varieties grown in the Netherlands for either malting or fodder purposes.

1986 Gutstein, I.
The effect of Israeli climatic conditions and soils upon the free and total β-amylase of three varieties of barley.
Bull. Res. Counc. Israel 1954 : **4** : 300–04.

In tests conducted in four localities in Israel during the period 1945–7, highly significant varietal and environmental variations in free and total β–amylase content were found among three six-rowed barleys. Varietal differences were greater than environmental, the barleys in descending order of β-amylase content being BMC, Gvatith and M–38.

1987 Kortenhorst, A. T.
De moutkwaliteit van enkele nieuwe gerstrassen. (**The malting quality of a few new barley varieties**).
19de Nacobrouw Jb. 1955 : 75–82.

Cylinders constructed of stainless steel, in which the temperature can be adjusted to any required level, were used in determining the germination of samples of malting barley in recent tests at Wageningen, Netherlands. The Norwegian variety Domen (cf. Abst. 1996) and the Finnish variety Pirkka germinated well and possessed outstanding malting properties, including high percentage of extraction and good enzyme activity. Of 13 varieties tested, Domen alone was capable of germinating within 3 weeks of harvesting. Minerva and PB26, new hybrids recently developed at Wageningen, proved unsuitable for malting purposes.

1988 Burkhart, B. A.
A pilot brewing procedure. Its reproducibility and its application to barley quality evaluation.
Wallerstein Labs. Commun. 1954 : **17** : 283–97.

The pilot malting and brewing procedures described are in use at the US Barley and Malt Laboratory, Madison, Wis., and are suitable for evaluating new barley selections. The evaluation of the malting and brewing properties of the selections North Dakota 103, 104 and 105, with Kindred as control, is given as an example of the application of the methods (cf. Abst. 1086).

1989 Baba, I.
(**Studies on the boron deficiency disease of barley, in particular the phenomenon of sterility attendant on boron deficiency and cytological investigations on it**).
Nogyo Gijutsu Kenkyusho Hokoku/Bull. Nat. Inst. agric. Sci. 1953 : Ser. D : No. 4 : 1–22. [Japanese].

Boron deficiency leads to pollen abortion in barley. If, however, boron-starved plants are supplied with boron two weeks before heading, viable but abnormal pollen grains are formed. The aberrations observed included chromosome doubling and irregular chromosome segregation.

1990 **New barley variety licensed.**
Cereal News 1954 : **1** : No. 13 : p. 18.

Kenate has been selected from the barley Kentucky 8 at the Ontario Agricultural College. Its chief merit is the possession of greater winter hardiness than Wong.

1991 Bruehl, G. W.
Barley adaptation in relation to *Pythium* root rot.
Phytopathology 1955 : **45** : 97–103.

The yields of different barley varieties in Dakota on soils heavily infected with *Pythium arrhenomanes* were related to their maturity and geographical origin. Medium and late varieties were superior to early varieties, and barleys from Manchuria, Ethiopia and Iraq surpassed material from Egypt, Afghanistan, Algeria and India. Evidence is presented that tolerance of *P. arrhenomanes* is associated with the rate of growth and development of the barley, which in some varieties is strongly modified by photoperiodic treatment.

1992 Tapke, V. F.
Physiologic races in *Ustilago nuda* and techniques for their study.
Phytopathology 1955 : **45** : 73–78.

On the basis of their reactions on the differential barley varieties Charlottetown (CI 2732), Compana (CI 5438), Freja (CI 7130), Stephan (CI 8051) and Valki (CI 5748), 143 collections of *U. nuda* from 30 American states, two from Canada and one from Mexico were found to comprise four physiological races. The two-rowed spring barleys Abyssinian (CI 668), Bifarb (CI 3951–3), CI 3694, CI 5798, Jet (CI 967) and Kitchin (CI 1296) were immune to all races. Jet also showed immunity to nine races of *U. nigra* and to seven of *U. hordei* and resistance to six other races of the latter. A list of 148 spring and 103 winter barleys arranged according to their degree of resistance is provided.

1993 **Trials 1953. Report of the Barley Committee of the European Brewery Convention 1955** : Pp. 95.

The results of varietal trials conducted in 1953 in 12 European countries are presented in tabular form. Of the seven varieties tested in all the participating countries, Proctor had the highest malting quality, but was slightly inferior in yield and straw strength to the highest yielding variety Carlsberg and was late in ripening.

1994 Fröier, K.
Försök och praktiska erfarenheter beträffande Svalöfs kornsorter. (**Trials and practical experiences concerning Svalöf barley varieties**).
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : 11–15.

Recommendations, based on the results of trials conducted from 1949 to 1954, are made as to the varieties of fodder and malting barley best adapted to the different regions of Sweden.

1995 Forsøg med bygsorter 1951–54. (**Trials of barley varieties, 1951-54**).
Tidsskr. Frøavl 1955 : **22** : 142–44.

In trials conducted at 11 stations in Denmark, Bonus gave the highest grain yield. All varieties yielded more straw in response to extra potassium nitrate fertilizer but only the stiff-strawed varieties showed an increase in grain yield. In preliminary comparative trials of new and old varieties carried out at three stations, Proctor and Abed 983 showed promise.

1996 Wilten, W. & Kortenhorst, A. T.
De veldproeven in 1954. (**The 1954 field trials**).
19de Nacobrouw Jb. 1955 : 83–93.

Tabulated data on yield, maturity, grain quality and resistance to lodging and mildew are presented for malting and fodder varieties tested at different centres in the Netherlands. Proctor gave the highest yields at Steenbergen and elsewhere in the southwestern clay belt, Piroline and Abed 978 were the most resistant to mildew, and Domen and Herta had the stiffest straw. Domen (Maskin [Machine] x Herse) is a new Norwegian variety with long straw and is suitable for combine harvesting. In the northeastern polder, Carlsberg II proved the most productive variety, but the results of trials in this area were partially invalidated by abnormal weather conditions before and during harvesting.

MILLETS AND SORGHUMS

1997 Yabuno, T.
Morphological and cytological studies in the genus *Echinochloa*.
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 66–71.

E. crus-galli vars. *caudata* and *praticola*, Sawa millet (*E. frumentacea*) and *E. frumentacea* var. *atherachne* were found to possess a chromosome number of $n = 27$. In *E. crus-galli* var. *oryzicola*, $n = 18$. The basic chromosome number of the genus is assumed to be 9. Intraspecific and interspecific crosses involving the hexaploid varieties were obtained. Many of the characters of the F_1 hybrids were intermediate between those of their parents but in the hybrids between the cultivated and wild forms the ripe spikelets were shed as easily as in the wild parents. All the hybrids formed 27 bivalents at metaphase I and equalled the parents in pollen and seed fertility. It is concluded that *E. crus-galli* vars. *caudata* and *praticola* and *E. frumentacea* have the same genomic constitution and that *E. crus-galli* is the ancestor of Sawa millet.

1998 Narayan, K. N.
Mitosis in the pollen mother-cells of *Pennisetum ramosum* ($2n = 10$).
Curr. Sci. 1954 : **23** : 407–08.

The occurrence of mitosis and other irregularities of microsporogenesis leading to the formation of inviable pollen has been observed in *P. ramosum* plants raised in California. It is noted that the species shows a tendency towards apospory.

1999 Harpstead, D. D., Ross, J. G. & Franzke, C. J.
The nature of chromatin changes of colchicine-induced variants in sorghum.
J. Hered. 1954 : **45** : 255–58.

The induction of variants showing no change in chromosome number, by treating true-breeding varieties with colchicine, has already been reported (cf. *PBA*, Vol. XXIII, Abst. 349 and Vol. XXIV, Abst. 2019). To determine whether chromatin rearrangement followed by somatic reductional grouping had been responsible for the origin of the variants, as previously suggested, meiotic investigations were carried out on the original material, the variants and F_1 hybrids from crosses between variants and their untreated full sibs or among the variants. No irregularity or rearrangement of the chromatin was detected in the analysis of pairing relationships at pachytene. It is postulated that the variants originated through gene mutation or cryptic structural changes in the chromatin.

2000 WATSON, S. A. & HIRATA, Y.
The wet milling properties of grain sorghums.
Agron. J. 1955 : **47** : 11–15.

Differences and similarities in the structure and composition of the kernels of sorghum and maize are analysed in relation to their bearing upon the problems of wet milling for starch production; commercial experience of wet-milling sorghums and the results of laboratory tests on nonwaxy and waxy varieties are discussed.

RICE

2001 PIACCO, R.
Sperimentazione su risi americani. (**Experiments with American rice varieties**).
Riso, Milano 1955 : **4** : No. 2 : 13–15.

Rice varieties from the USA are too late in maturity when grown in Italy. The only varieties that ripened were Century Patna and Patna in the long, Cody in the short and Early Prolific, Magnolia and Edith Long in the medium group. Only Magnolia is thought to have any possible interest for Italian conditions and is described.

SILOW, R. A. (EDITOR).
Report of the Fourth Meeting of the International Rice Commission's Working Party on Rice Breeding convened by the Food and Agriculture Organization of the United Nations, Bangkok, Thailand, September, 1953.
Develop. Pap. FAO UN, Rome 1954 : No. 40 : Pp. 32.

2002 *The FAO international rice hybridization project.* (*pp. 10–13*).

F_2 seed from 191 of the 270 crosses between 33 *indica* and 8 *japonica* parents has been sent to countries participating in the scheme. Less fertile hybrids were back-crossed to their respective *indica* parents; 534 back-cross plants representing 48 crosses have resulted from 21,699 pollinations. Two additional *japonica* types known to give fertile hybrids with *indica* have been included in later crosses. Cytological investigations suggest that low fertility in *indica-japonica* hybrids may be caused by irregularities of anaphase I.

2003 *The maintenance of genetic stocks of rice.* (*pp. 14–16*).

Recommendations for registration and permanent maintenance of material of genetical value are listed.

2004 *Photoperiod response.* (*pp. 18–19*).

The varieties tested showed a similar pattern of reaction in India, Ceylon and Indonesia but there were wide differences in the times of ear initiation and emergence at the different centres.

2005 *Breeding for resistance to* Piricularia *and* Helminthosporium. (*p. 21*).

Piricularia-resistant material has been obtained in Japan from crosses involving *indica* and *japonica* varieties. Types showing resistance to *Piricularia* and *Helminthosporium* and suitable for cultivation or for use as parents in hybridization schemes have been identified in India.

SILOW, R. A. (EDITOR).
Report of the Fifth Meeting of the International Rice Commission's Working Party on Rice Breeding convened by the Food and Agriculture Organization of the United Nations, Tokyo, Japan, October, 1954.
Develop. Pap. FAO UN, Rome 1954: No. 46 : Pp. 58.

2006 *The FAO international rice hybridization project.* (*pp. 11–17*).

It is reported that preliminary cytogenetic investigations indicate that gene substitution differences in chromosome structure are among the causes of sterility in *japonica-indica* hybrids (cf. Absts. 1103 and 2002). At all stations a wide range of segregation occurred in the F_2 generation of *japonica-indica* material distributed to countries participating in the above project, some high-yielding selections having been obtained in India.

2007 *The maintenance of genetic stocks of rice.* (*pp. 17–21*).

Some 850 registered stocks from 30 countries are being maintained at five centres in India, Indonesia, East Pakistan, Japan and the USA, respectively.

2008 *Photoperiod response.* (*pp. 29–31*).

Cooperative investigations in Indonesia, India and Japan are reported. In all three countries all varieties exhibited short-day reaction but varied widely in sensitivity. Bulu varieties adapted to photoperiods in Indonesia showed marked sensitivity to the photoperiods of Japan and India. Lengthening of the photoperiod increased plant height, panicle length, grain yield and fertility but decreased ear number. Work reported from Ceylon suggests that a series of multiple alleles at a locus in Jodon's linkage group I determines the expression of sensitivity to photoperiod; genes at this locus appear to exercise a pleiomorphic effect on tiller number.

2009 *Resistance to lodging.* (*pp. 31–34*).

It is reported from Japan that varieties resistant to lodging tend to produce short stems bearing small light ears, the latter being a disadvantage which can be avoided by breeding for increased number of tillers.

2010 *Interaction between varieties and fertilizer response.* (*pp. 34–37*).

In Viêt-Nam the variety Doc Phung Lun showed the highest fertilizer response and Ve Vang the lowest. In India the coarse-grained strain 349 Jhona gave twice the yield of the fine-grained strain 370 Basmati in unfertilized plots but was out-yielded by the latter at high levels of nitrogen application. It is reported from Japan that *indica* varieties showing low response possess an initial high rate of N absorption accompanied by a low rate of N assimilation, with a subsequent decrease in absorption leading to N starvation in the later stages of growth. High response appears to be associated with short straw, short panicle and numerous ears, and low response with long straw, long panicle and few tillers. These morphological characters have provided a useful basis for selection for fertilizer response. With progressively heavier N applications, the grain/straw ratio decreases in low-response varieties but remains fairly constant in high-response varieties.

2011 *Pests of rice* (*pp. 38–40*).

Apparent segregation for resistance to *Chilo simplex* has been observed in the F_2 of a cross between two Egyptian varieties, of which one was susceptible and the other fairly resistant. Thin-culmed varieties were less susceptible than those with thicker culms.

2012 *Diseases of rice* (*pp. 40–42*).

Breeding for resistance to blast is in progress in several countries, and in Taiwan some promising selections have been obtained from a cross between two *japonica* varieties. Isolates of *Piricularia* from three different areas in the USA tested on two varieties have shown that two races are concerned. The need for uniform techniques for testing for resistance is stressed.

2013 JODON, N. E.
Breeding for improved varieties of rice and other cereal grains.
Rice J. 1954 : **57** : No. 5 : 32–36.

Rice breeding at the Rice Breeding Station in Louisiana is outlined and a description is given of the following four selections under consideration for increase and possible release as commercial varieties: 44C507 (Rexoro-Purpleleaf x Magnolia), 46C711 (4–II–14–8 x Bluebonnet), 45C554 (Rexoro Purpleleaf x Selection G) and 450 15/16 Rex–3–22 (Rexoro 4 x Blue Rose). It is mentioned that selection of grain sorghums suitable for combine harvesting is also in progress at the station.

2014 **Toro, new variety, is leader in Louisiana yield tests.**
Rice J. 1954 : **57** : No. 12 : p. 14.

The rice variety Toro has outyielded Bluebonnet and other varieties in tests in Louisiana and it is to be increased for foundation seed. It is short-strawed and more resistant to kernel smut than Bluebonnet and Sunbonnet; its milling quality is high. Its parentage includes Rexoro, Fortuna and Blue Rose.

2015 Uitgifte van het rijstras Dima. (**Release of the rice variety Dima**).
Surinaam. Landb. 1954 : **2** : 261–62.

Dima, a new large-grained variety selected at the Paramaribo Agricultural Research Station, Dutch Guiana, is described. It is suitable for mechanical harvesting and, on clay soils, gives high yields of good quality grain and is resistant to lodging; the new variety is not recommended for cultivation on sandy soils. Dima is not sensitive to photoperiod to the same extent as most other varieties grown in Guiana.

2016 NAGAO, S. & TAKAHASHI, M.
(**Studies on rice hybridization. XVI. On the genes responsible for the yellow and brown colour system of the glumes**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **4** : No. 1 : 25–30. [Japanese].

A genetic analysis of a series of rice crosses has led to the following conclusions on the genetics of glume pigmentation. Uniform golden coloration of the glume is determined by a recessive gene denoted *rg*. Longitudinal golden banding is determined by a dominant gene *F*, which is inhibited in the presence of the suppressor *I*.

Black glumes are determined by the presence of three dominant genes, Rb_1, Rb_2 and Rb_3, not two as earlier workers have postulated.
Brown mottling of the glume and leaf is brought about by a single recessive gene (*mt*).
I does not appear to be a member of any of the recognized linkage groups; *mt* appears to be linked as follows: $mt–d_1–gl$.

2017 Oka, H.
(**Classification of rice varieties in the light of hybrid sterility. II. Phylogenetic differentiation of cultivated rice**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 1–6. [Japanese].
Continuing his researches on the 120 varieties discussed in an earlier paper (cf. Abst. 309), the author crossed each variety with seven tester varieties. The hybrids were classified into two categories according to whether the percentage of good pollen was over or under 87·5%. Of the $2^7 = 128$ possible combinations of varietal reaction for the range of tester varieties, 31 were actually found. The 31 groups of varieties could be further classified into two major groups I and II, each subdivided into subcategories a and b. Group I corresponded fairly closely with the Continental group of the earlier paper, while subgroups IIa and IIb were the approximate equivalents of the Tropical Insular and Temperate Insular groups, respectively.

2018 Katayama, Y. & Shida, S.
(**A further report on the inheritance of a striped rice**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 15–18. [Japanese].
The maternal inheritance of plastid type in the variegated strain described by the authors in an earlier report is confirmed (cf. Abst. 1104). Three variegated strains characterized by distinct pigmentation patterns arose from the original strain, together with a strain in which the seedlings were yellow at low temperatures, chlorophyll only developing after 5–6 days.

2019 P., R.
Una varietà che si riprende: Stirpe 136. (**A variety that is recovering lost ground—Strain 136**).
Riso, Milano 1955 : **4** : p. 22.
This well-known selection from Lady Wright is recommended to Italian rice growers for its yield, quality and resistance to lodging. The difficulty of separating grain and husk in threshing may be an advantage in districts subject to hail.

2020 Oka, H., Chang, T.-T. & Hong [Hung], M.-S.
Reciprocal translocation in rice. (**A preliminary note**).
Nungyeh Yenchiu/Agric. Res., Taipei 1953 : **4** : No. **3** : 49–54.
Semisterile lines were obtained by X irradiation of the varieties Tai-chung 65 and Pei-ko-hua-lo. From the genetical behaviour of the sterility and the presence in some cases of a quadrivalent at meiosis, it is concluded that the lines carry reciprocal translocations.

2021 Nagamatsu, T.
(**On some characters of F_2 and F_3 intersubspecific hybrids of tetraploid rice with special reference to the fertility and number of grains per panicle in comparison with autotetraploid material**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 71–75. [Japanese].
Observations on vegetative period, dimensions of the plants, number of panicles per plant, number of grains per panicle and degree of fertility were made on the F_2 and F_3 generations of selected colchicine-induced tetraploid lines of the hybrid *Oryza sativa* var. *japonica* 'Sekitori' [Champion] x *O. sativa* var. *indica* 'Konan.' This material compared favourably as regards number of grains per ear and fertility with a population of tetraploid rice derived from the spontaneous autotetraploids described by Morinaga and Fukushima in 1937 (cf. *PBA*, Vol. VIII, Abst. 867).

2022 Katayama, Y.
Studies on the haploidy in relation to plant breeding. II. Offsprings from haploid individuals of rice.
Cytologia, Tokyo 1954 : **19** : 152–56.
Haploids of the varieties Shin-ai, Saitama-mochi [Saitama glutinous rice] and Takara produced diploid seeds as the result of bud variation, four types of panicle being observed: (1) some branches were fertile whereas others were sterile, (2) the whole panicle was fertile, (3) small grains were distributed over the entire panicle, on otherwise sterile branches, and (4) the panicle was completely sterile. The four types are explained histogenically.

2023 Wada, E. & Nojima, K.
(**Studies on the sensitivity of rice to temperature and illumination. III. On variation in heading date due to changes in sowing date**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 27–35. [Japanese].
Data on the vegetative period of a world collection

of rice varieties sown in April, May, June and July are presented. Many of the varieties could be classified into one of two groups, the first comprising varieties whose vegetative period is curtailed by high temperature, and the second, those in which the vegetative period is reduced by short photoperiods. These two groups are characteristic of northern and southern Japan respectively. In China both groups occur but are less easy to distinguish. In south-east Asia, only group I occurs.

2024 Misra, G.
Photoperiodism in rice. II. Photoperiodic response of four early varieties of rice of Uttar Pradesh.
New Phytol. 1955 : **54** : 29–38.

A preliminary account of this investigation of the effects of short-day treatment upon the early varieties T136, TN22, TN27 and Ch.10 has already been summarized (cf. *PBA*, Vol. XXII, Abst. 415).

2025 Misra, G.
Photoperiodism in rice. III. Effect of short day-length on four late-winter varieties of rice of Orissa.
Proc. Indian Acad. Sci. 1954 : Ser. B. : **40** : 173–82.

All four varieties showed a delay in ear emergence compared with the controls when exposed to a 10-hour photoperiod during the seed-bed stage for 3 to 6 weeks, the delay increasing with the duration of the treatment (cf. Abst. 2024). When the short-day treatment was applied to the seedlings for 6 weeks and then continued after transplantation until ear emergence, a reverse effect was observed, the ears emerging earlier than in the controls. With this prolonged treatment, the four varieties studied showed the following average reduction (in days) in the duration of the period between sowing and ear emergence compared with their respective controls: C3, 31·80; SR26B, 10·85; FR13A, 2120; and FR 43B, 35·10 in 85% of the plants and 68·40 in 15%.

2026 Sircar, S. M. & Ghosh, B. N.
Studies on the physiology of rice. VIII. The effects of low and high temperature germination with or without short days on summer and winter varieties.
Proc. nat. Inst. Sci. India 1954 : **20** : 452–65.

Short-day treatment of summer varieties resulted in reduction in height, increase in leaf number, retardation of flowering and decrease in grain yield through failure to set. High pre-sowing temperatures increased height in Panbira and Charnock, slightly accelerated flowering in Panbira and generally increased grain yield but these effects were annulled by exposure to short days following the high temperature treatment. In the winter variety Rupsail short-day treatment resulted in an increase in tillering, reduction in height and leaf number, acceleration of flowering and decrease in grain yield, due to reduction in ear length.

2027 Ghose, R. L. M. & Shastry, S. V. S.
Response of rice varieties to short-day treatment.
Euphytica, Wageningen 1954 : **3** : 221–28.

Thirty-day-old seedlings of 51 *indica* varieties in use as parents in the two *japonica-indica* projects now being carried out at the Central Rice Research Institute, Cuttack, under the sponsorship of FAO and the Indian Council of Agricultural Research, respectively, were exposed to an 8-hour photoperiod for 20 days in sowings during different months. Synchronization of flowering was achieved among the varieties, the later the type the greater being the photoperiodic response, i.e. the reduction in the time taken by the control to reach the flowering stage. The regression value of the photoperiodic response over the natural duration of the time taken from sowing to flowering was approximately 1·0 for all varieties and all monthly sowings.

2028 Wada, E.
(**Studies on the sensitivity of rice to temperature and illumination. II. On the reaction of upland rice and foreign rices and on the connexion with geographical distribution**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 22–26. [Japanese].

The effect of various temperature and photoperiodic treatments on the vegetative period of 25 Japanese upland varieties and on a world collection of rices drawn from Japan, China, Taiwan, Russia, India, Indochina, Indonesia, Europe and America is reported. In general, the upland varieties were comparatively insensitive to temperature and photoperiod. In the case of the world collection, many varieties showed signs of special adaptation to the temperature and light conditions of the region from which they had been imported.

2029 Shibuya, T.
Studies on diurnal variation of rooting activity in rice seedlings and its practical application.
Yamagata Daigaku Kiyo (Nogaku)/Bull. Yamagata Univ. (Agric. Sci.) 1954 : **1** : 326–45.

A series of experiments on the effects of various environmental conditions on the rate of root development in rice after transplantation are described. The roots of 15 out of 16 of the varieties investigated grew more rapidly if transplantation was performed in the evening; the exception was the variety Waseaikoku. Root growth in the transplanted seedlings was depressed by high nocturnal temperature, the degree of inhibition varying with the variety. Data are provided on the effect of $(NH_4)_2SO_4$, α-naphthalene acetic acid and 2,4–D on root development.

2030 Weeraratna, H.
Hybridization technique in rice.
Trop. Agriculturist 1954 : **110** : 93–97.

The techniques of emasculation and pollination found satisfactory in crossing rice under field conditions at Maha Illuppallama and Batalagoda, Ceylon, are described in detail. A panicle in its second day of opening is chosen for emasculation. To facilitate stamen removal, suitable spikelets are subjected to hard blowing with the mouth for 6–7 mins., to cause elongation of the filaments so that the glumes are forced open when the anthers reach the apex of the spikelet. The best period for emasculation has proved to be 6.00–8.00 hr. The period of 9.00–10.30 hr. on the third day after emasculation is the most suitable for pollination.

Data on crossing the Indian line Prb–16 ♀ with the local lines Vellai Illankalayan 28061 and Pachchaiperumal 2462/11 suggested that substances inhibitory to foreign pollen accumulated in the stigmas of Prb–16, reaching, by the third day after emasculation, a concentration sufficient to suppress pollen growth completely. The results from reciprocal crosses provided no evidence that comparable inhibitory substances were secreted by the stigmas of the two local varieties. The high percentage of seed set when Prb–16 was selfed on the third day after emasculation indicated that its stigmas had not lost their receptivity to any appreciable extent.

2031 Suetsugu, Y.
(**Morphological studies on the development of the embryo in rice varieties**).
Nogyo Gijutsu Kenkyusho Hokoku/Bull. Nat. Inst. agric. Sci. 1953 : Ser. D. : No. 4 : 23–52. [Japanese].

This article is an extended version of that summarized in Abst. 1110.

2032 De Beni, U.
Il "Balilla" a grana grossa. (**Large-grained Balilla**).
Riso, Milano 1955 : **4** : No. 2 : 22–24.

The variety described was obtained by selection from the rice Balilla. It is resistant to brusone (*Piricularia*) and to *Fusarium* attack; in yield it is equal to Balilla, both having given over 109 q. of grain per ha. in 1954; it has equally strong straw and a 1000 grain weight of 26·78 q. On account of the larger grains it commands a higher price on the market.

2033 Kondo, G. & Sugiura, H.
(**On varietal differences in the resistance of rice to *Cochliobolus miyabeanus***).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 76–82. [Japanese].

Clearly-marked differences in the degree of resistance of a series of 116 Japanese and American varieties to the above pathogen are reported. A slight correlation between varietal susceptibility and incidence of leaf wilting was detected.

2034 Asada, Y., Akai, S. & Fukotomi, M.
(**Varietal differences in the susceptibility of rice to *Cochliobolus miyabeanus***).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **4** : No. 1 : 51–53. [Japanese].

Over 1000 varieties were tested for resistance to the above pathogen at Kyoto University. The most resistant varieties were No. 217, Chiu-tzu-chiu and a variety from the island of Hainan.

2035 Goto, K. & Fukatsu, R.
(**Studies on stem rot of rice. I. Intervarietal differences in resistance and the course of development**).
Tokai Kinki Nogyo Shikenjo Kenkyu Hokoku/Bull. Div. Pl. Breed. Cult. Tokai-Kinki agric. Exp. Sta. 1954 : No. 1 : 27–39. [Japanese].

Some 120 varieties were studied for incidence of stem rot (*Leptosphaeria salvinii*). In general, resistance was associated with lateness and profuse tillering. Shinriki [Divine Power] and Sembon strains are noted as particularly resistant. Gimbozu [Silver Bonze] is also resistant though early and producing few tillers.

MINOR CEREALS

2036 NIRODI, N.
Studies on some Asiatic relatives of maize.
Diss. Abstr. 1954 : **14** : Publ. No. 8988 : p. 1513.

Investigations were carried out on the taxonomy, chromosome morphology and meiotic behaviour of *Coix poilanei*, *C. lacryma-jobi*, *C. gigantea*, *Polytoca macrophylla* and *Chionachne koenigii*. The marked similarity between all the component genomes of *Coix* led to the conclusion that the three species studied constituted a $2n$–$4n$–$8n$ series. It is further concluded that the genus *Coix* is more closely related to the New World representatives of the Maydeae than either *Polytoca* or *Chionachne*.

FORAGE GRASSES

IV Reunión Técnica sobre Plantas Forrajeras. (**Fourth Technical Meeting on Forage Plants**).
Idia 1954 : No. 81 : 38–48.

The meeting took place at the Anguil Experimental Station in Argentina and was attended by specialists from Brazil and Uruguay as well as those from Argentina. The papers read included the following:—

2037 *Covas, G. & Cialzeta, C. Híbridos comerciales interespecíficos en especies forrajeras.* (*Commercial interspecific hybrids in forage species*).

The use of F_1 seed of interspecific hybrids is recommended for increasing yield in a number of forage crops. By planting certain self-sterile plants of *Phalaris tuberosa* and *Ph. arundinacea* together 75% of hybrid seed has been obtained and the hybrids are multiplied clonally.

2038 *Godeck, W. Resultados obtenidos con 35 clones a través de 3 años consecutivos de autofecundación y sus posteriores cruzamientos recíprocos.* (*Results obtained with 35 clones by three consecutive years of self fertilization and their subsequent reciprocal crosses*).

No marked loss in vigour was noted after three years of selfing of the lucernes referred to.

2039 *Tomé, G. Cruzamientos interespecíficos en sorgos.* (*Interspecific crosses in sorghum*).

Crosses of *Sorghum almum* x *S. caffrorum* have given rise to plants with $2n = 40$, erect habit, high palatability and winter hardiness. The cross was made by making use of a male-sterile line of Blackhull (*S. caffrorum*).

2040 *Villar, A. D. Selecciones mejoradas de sorgo azucarado.* (*Improved selections of sweet sorghum*).

Selection S 232 is characterized by reduced toxicity, high yield, palatability, large leaves and freedom from lodging. Selection S196 is resistant to drought and being smaller in stature is suitable for grazing.

2041 *Villar, A. D. Comportamiento de nuevas selecciones y variedades de sorgo del Sudán en la región pampeana.* (*Behaviour of new selections and varieties of Sudan grass in the Pampas region*).

Selections Oliveros 4203 and Castelar Line C have yielded more fodder than Sweet Sudan and excel it also in tillering capacity.

2042 *Parodi, R. Comportamiento de selecciones de sorgo negro en la región pampeana.* (*Behaviour of selections of black sorghum in the Pampas region*).

Several selections of *Sorghum almum* with reduced rhizome formation are referred to.

2043 *Serrano, H. Comportamiento de nuevas selecciones de* Phalaris tuberosa *en la región pampeana.* (*Behaviour of new selections of* Ph. tuberosa *in the Pampas region*).

Selection Pergamino 174–1 exceeded the control by 60–70% in yield of green matter.

2044 *Ballari, C. P. Especies forrageras anuales interesantes para la región semiárida.* (*Annual forage species of interest for the semiarid region*).

Hybrids of *Triticum* x *Agropyron* have given good results as forage plants.

2045 *Serrano, H. Comportamiento de nuevas selecciones de* Phalaris minor *en la región pampeana.* (*Behaviour of new selections of* Ph. minor *in the Pampas region*).

Selections Pergamino PF 191 and Castelar FO–500 have exceeded the control by 24% in yield of green fodder.

2046 *Villar, A. D. Progresos logrados en el mejoramiento de la cebada forrajera.* (*Progress achieved in breeding fodder barley*).

The best results were given by selections from the hybrid (Primor x Trebi) x Engledow India, which gave high yields of fodder and were resistant to the two Argentine races of *Erysiphe graminis* and to *Rhyncosporium secalis*, besides being field resistant to *Puccinia anomala* and *Helminthosporium teres* and very frost resistant.

2047 *Triveño Pinto, R. Comportamiento de selecciones y variedades de cebada forrajera en la región pampeana. (Behaviour of selections and varieties of forage barley for the Pampas region).*

A selection from the cross (Primor x Trebi) x Massaux and the selection FAV 19 have proved outstanding, the latter being resistant to green aphids.

2048 DE WET, J. M. J.
Chromosome numbers of a few South African grasses.
Cytologia, Tokyo 1954 : **19** : 97–103.

The chromosome numbers of 47 species belonging to 29 genera were determined. Ten genera, investigated cytologically for the first time, were found to have the following basic numbers: *Enneapogon*, 12; *Pogonarthria*, *Triraphis*, *Schizachyrium*, *Urochloa*, *Bothriochloa*, *Dichanthium* and *Hemarthria*, 10; and *Acroceras* and *Rhynchelytrum*, 9. The genus *Aristida* was characterized by two basic numbers, $x = 11$ and 12. *Hyparrhenia hirta* was represented by two chromosome races, with $2n = 30$ and 45, respectively. The basic number of this species may therefore be regarded as $x = 15$. In *H. aucta*, $2n = 20$ and $x = 10$.

2049 BOR, N. L.
Notes on Asiatic grasses : XIX. New species and new names.
Kew Bull. 1954: 497–502.

The new species *Agrostis nagensis*, *Erianthus wardii*, *Stipa chitralensis*, *S. munroana* and *Poa afghanica* are among the new species described.

2050 JULÉN, G.
Svalöfs original Atlas ängsgröe. (**The smooth-stalked meadow grass Svalöf original Atlas**).
Sverig. Utsädesfören. Tidskr. 1954 : **64** : 359–65.

JULÉN, G.
Svalöfs original Atlasängsgröe. (**The smooth-stalked meadow grass Svalöf original Atlas**).
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : 27–30.

The difficulty of combining strong vegetative development with high yield of seed in smooth-stalked meadow grass has been successfully overcome at the Plant Breeding Institute in Svalöf by the production of the above variety. Atlas, derived from a plant collected in the Piteå Archipelago, grows fast in spring and gives abundant seed and provides a luxuriant leafy pasture, but is not as vigorous in stolon formation as Skandia II, Fylking, Primo or Gullåker; in summer its yield about equals that of other good varieties, but in autumn it is a little less. It is recommended to replace Skandia II in Sweden and should provide home grown seed on an adequate scale.

In recent trials in Västgöta, Östgöta, Värmland and Jämtland, it has given a higher average yield than all other varieties.

2051 GRUN, P.
Cytogenetic studies of *Poa*. II. The pairing of chromosomes in species and interspecific hybrids.
Amer. J. Bot. 1955 : **42** : 11–18.

Investigations were carried out on representatives of *P. ampla*, *P. arida*, *P. compressa*, *P. nevadensis*, *P. pratensis*, *P. pratensis* ssp. *alpigena* and *P. scabrella*, this material ranging in chromosome number from $2n = 42$ to 106 (cf. Abst. 316). Chromosome pairing was usually irregular, univalents being observed at metaphase I. The number of univalents was not correlated with chromosome number. The frequency of univalents in the F_1 hybrid between species belonging to different sections of the genus was in some cases (*P. scabrella* x *P. pratensis*, *P. scabrella* x *P. ampla* and *P. arida* x *P. ampla*) no higher than in parental species, but the F_1 hybrids of *P. ampla* x *P. pratensis* and *P. ampla* x *P. compressa* formed more univalents than their parents. The F_2 derived from self pollination of *P. scabrella* x *P. pratensis* showed a limited amount of segregation for morphological and physiological characters; some pairing between the chromosomes of the two species had therefore occurred. Although chromosome pairing in the F_1 of this hybrid was fairly regular, it showed in the F_2 a greatly increased range of irregularity, which was not related to chromosome number, morphological or physiological similarity of the segregates to their parents, or the general vigour of the F_2 plants. Possible causes of this increased irregularity are briefly discussed.

2052 JUHL-NOODT, H.
Apomixis und umweltbedingte Variation bei *Poa pratensis* L. (**Apomixis and environmentally conditioned variation in *P. pratensis* L.**).
Züchter 1955 : **25** : 80–86.

The results of studies conducted at the Botanical

Institute, Kiel, on apomixis and local variations found in Schleswig-Holstein are described. No correlation was established between the place of origin and the morphological characteristics of any particular strain on the one hand and its mode of reproduction on the other. Only 4 of the 25 plants examined produce all their offspring sexually, the remainder showing a gradation from partial to almost complete apomixis. Progeny obtained by sexual reproduction segregated in the F_1 and F_2, giving rise to numerous aberrant forms. The phenomenon of apomixis was itself relatively unstable, the proportion of aberrant plants produced varying from 1·8 to 45%. The author suggests that, under natural conditions, apomictic progeny normally tend to have a selective advantage over plants that have arisen through sexual reproduction.

Specimens of *P. pratensis* obtained from saline soils had a smaller growth habit and narrower leaves than plants from nonsaline soils. When planted out in the gardens of the Botanical Institute, both types displayed a more luxuriant growth habit than in their natural habitat, a feature which was the more pronounced in plants from saline soils.

2053 TARAKANOV, K. N.
(A historical and ecological basis of inheritance of characters in some grasses).
Ž. obšč. Biol. (J. gen. Biol.), Moskva 1954 : **15** : 446–50. [Russian].

It is thought that the ancestral form of *Stipa capillata* and *S. sareptata* which are found in the arid steppe and yet are susceptible to drought was a mesophyte. On the other hand, *Poa alpina*, growing in the montane and arctic regions, is regarded on account of its drought resistance as a form which has evolved under the conditions of desert or steppe.

2054 MANNER, R.
Hammenhögs Coxa hundäxing. **(The Hammenhög cocksfoot Coxa).**
Våren 1955. Hammenhögs, Otto J. Olson & Sons AB 13–17.

This new variety, bred at the Gullåker Plant Breeding Institute in Sweden and formerly called Hammenhög 48–267, is derived from Gullåker cocksfoot. Its first and second cuts differ less than is usual for this grass and, in trials at Gullåker, its superiority over older strains was 12% and 5% for the first and second cuts respectively. Coxa and Gullåker head about the same time, i.e. a day earlier than Brage and Tardus II on the average. Coxa is superior to the other three varieties in the percentage of hay per unit of green matter and it also produces a higher percentage of leaves and only two-thirds as much straw as Brage. Both Gullåker and Coxa showed a higher crude protein content than Brage.

2055 CORKILL, L.
A new, improved strain of cocksfoot.
NZ J. Agric. 1954 : **89** : 481–82.

The strain Grasslands, bred in New Zealand, shows improved seedling vigour and productivity compared with C23 and Akaroa. This superiority is particularly evident in its spring growth. The strain gives satisfactory seed yields.

2056 BOYKO, H. & TADMOR, N.
An arid ecotype of *Dactylis glomerata* L. (orchard grass) found in the Negev (Israel).
Bull. Res. Counc. Israel 1954 : **4** : 241–48.

A drought-resistant form which may prove of use in breeding has been found in a few localities.

2057 MANNER, R.
Vanadistimotej i försök 1944–1954. **(Vanadis timothy in trials, 1944-54).**
Våren 1955. Hammenhögs, Otto J. Olson & Sons AB 18–20.

During the past ten years, in official trials, in tests at Gullåker and also in general cultivation in southern and central Sweden, Vanadis has been characterized by high yielding capacity and, in particular, good aftermath production.

2058 MURAKAMI, M.
(Bulk emasculation methods for forage plants. I. Emasculation of timothy by the hot water method).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **4** : No. 1 : 14–17. [Japanese].

The optimum method for emasculating *Phleum pratense* was 15–20 minutes treatment with water at 43° C. or 10–15 minutes at 45° C.

2059 JULÉN, G.
Bottnia II, en ny högtavkastande och uthållig timotejsort för Norrland. **(Bottnia II, a new high-yielding and hardy variety of timothy for Norrland).**
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : 25–27.

JULÉN, G.
Svalöfs original Bottnia II timotej. **(The Svalöf original timothy Bottnia II).**
Sverig. Utsädesfören. Tidskr. 1954 : **64** : 366–69.

Bottnia II, obtained by line selection from

Bottnia I, (cf. *PBA*, Vol. XXIV, Abst. 2746) is superior to its parent variety in yield, hardiness and resistance to *Sclerotinia borealis*. It is to be released in spring, 1955.

2060 LANGDON, R. F. N.

The origin and distribution of *Cynodon dactylon* (L.) Pers.

Pap. Dep. Bot. Univ. Qd. 1954 : **3** : 42–44.

Literature on the origin of *C. dactylon* is surveyed. A study of the occurrence of the fungal parasites of the species suggests that it was restricted to the Old World, excluding Australia, until it achieved its present range by human agency. It is suggested that the species gained a foothold in Australia during the first decade of the European colonization of the country.

2061 KNOWLES, R. P.

Testing for combining ability in bromegrass.

Agron. J. 1955 : **47** : 15–19.

The results of a comparison of progenies from open-pollinated selections with test crosses involving the same selections at the Forage Crops Laboratory, Saskatoon, Sask., indicated that testing of progenies from open-pollinated seed is a suitable method of identifying parent plants with superior combining ability for forage yield. Regression of open-pollinated progenies on parent clones varied from 0·12 to 0·34 for forage yield, 0·08 to 0·11 for seed production and 0·34 to 0·62 for degree of creeping habit of the roots. Several first-generation synthetics developed on the basis of the results of tests on open-pollinated progenies gave significantly higher forage and seed yields than the control varieties.

2062 BARNETT, F. L.

A karyological survey of several *Bromus* species.

Agron. J. 1955 : **47** : 88–91.

Investigations were carried out on the chromosome numbers, meiotic behaviour and, to a lesser extent, the chromosome morphology of species representing the sections *Bromium*, *Bromopsis*, *Ceratochloa* and *Eubromus*. Chromosome numbers ranged from $2n = 14$ to 84. The following $2n$ numbers are reported, apparently for the first time: *B. frondosus*, *B. tomentellus*, 28; *B. scoparius*, *B. tectorum* var. *nudus*, 14; and *B. valdivianus*, 42. Aberrants of *B. erectus* had $2n = 70$ or 84 chromosomes. With the exception of *B. tomentellus* ($2n = 28$), which formed a variable number of quadrivalents, all the diploid, tetraploid and hexaploid species displayed complete, or almost complete, bivalent pairing. Octoploid and decaploid species exhibited univalents and multivalents in variable frequencies, quadrivalents being the most common type of multivalent. Chromosome stickiness was observed at diakinesis in a number of species; this feature was especially notable in the higher polyploids of sect. *Bromopsis*. Satellited chromosomes occurred in several species. Intraspecific and interspecific differences in chromosome length appeared to exist.

2063 WIRÉN, G.

Weibulls Viris rajgräs. (**Weibull's Viris ryegrass**).

Weibulls ill. Årsb. 1955 : 28–29.

In recent trials conducted at Weibullsholm, this new variety (cf. *PBA*, Vol. XXIII, Abst. 1989) has consistently outyielded the Svalöf variety Viktoria by amounts varying from 4 to 21%.

2064 JENKIN, T. J.

Interspecific and intergeneric hybrids in herbage grasses. IX. *Festuca arundinacea* with some other *Festuca* species.

J. Genet. 1955 : **53** : 81–93.

"*Festuca arundinacea* ($2n = 42$) and *F. pratensis* ($2n = 14$) can be intercrossed in either direction without serious difficulty.

"The F_1 hybrids so obtained are very highly but not completely sterile.

"It would appear that the effective gametes produced by these F_1 hybrids carry *F. arundinacea* chromosomes mainly, but that in some cases *F. pratensis* genes may be present.

"*F. arundinacea* can also be intercrossed without serious difficulty with *F. gigantea* ($2n = 42$), and the cross is effective when made in either direction.

"The F_1 hybrids so obtained were even more highly sterile than those of *F. arundinacea* with *F. pratensis*.

"Established F_1 hybrid plants were obtained when *F. rubra* ($2n = 42$) was pollinated by *F. arundinacea*, but the caryopses produced when the cross was made in the opposite direction failed to germinate.

"The F_1 hybrids of *F. rubra* with *F. arundinacea* were physiologically very incompetent under varied conditions and failed to produce inflorescences, although, with difficulty they could be perpetuated vegetatively.

"In a single attempt, using *F. heterophylla* ($2n = 28$?) as the pistillate parent and *F. arundinacea* as the pollen parent, definite caryopses were produced but the seeds failed to germinate." (Cf. *PBA*, Vol. XXIV, Abst. 3044).

[Author's summary].

2065 JENKIN, T. J.

Interspecific and intergeneric hybrids in herbage grasses. X. Some of the breeding interactions of *Festuca gigantea*.

J. Genet. 1955 : **53** : 94–99.

"A single attempt to intercross *Brachypodium sylvaticum* and *Festuca gigantea* gave negative results.

"It is doubtful whether the ovaries of *Festuca gigantea* were stimulated when the species was pollinated by *Bromus asper*, but when the cross was made in the opposite direction caryopses were produced. The seeds did not germinate.

"As previously reported, *F. gigantea* ($2n = 42$) and *F. arundinacea* ($2n = 42$) gave established F_1 hybrids when they were intercrossed in either direction.

"It is now shown that *F. gigantea* can be similarly intercrossed with *F. pratensis* ($2n = 14$) to give established F_1 hybrids irrespective of the direction in which the cross is made.

"The fertility of the *F. gigantea*-*F. pratensis* F_1 hybrids is very low, but as pistillate parents they have produced second-generation plants by backcrossing to either parent species.

"Established third-generation plants were obtained by further backcrossing the (*F. gigantea*-*F. pratensis*) x *F. gigantea* second-generation plants to either *F. gigantea* or *F. pratensis*.

"The second-generation plants (*F. gigantea*-*F. pratensis*) x *F. pratensis* failed to give third-generation plants when back-crossed to either original parental species, but caryopses were produced when *F. pratensis* was the pollinator.

"Evidently, normal fertility is not easily regained by backcrossing to the parental species so that intercrossing between *F. gigantea* and *F. pratensis* in nature would be expected to have little permanent effect upon a natural population." [Author's summary].

2066 JENKIN, T. J.

Interspecific and intergeneric hybrids in herbage grasses. XI. Some of the breeding interactions of *Festuca pratensis*.

J. Genet. 1955 : **53** : 100–04.

Crosses of *F. pratensis* with *Glyceria fluitans*, *Bromus asper* and *B. erectus* did not result in the formation of caryopses. In crosses of *F. pratensis* with *F. capillata*, *F. heterophylla* and *F. rubra* caryopses were developed but no germinable seed was obtained. Highly sterile hybrids were secured from crosses of *F. pratensis* with *F arundinacea* and *F. gigantea*.

2067 JENKIN, T. J.

Interspecific and intergeneric hybrids in herbage grasses. XII. *Festuca capillata* in crosses.

J. Genet. 1955 : **53** : 105–11.

"With the tetraploid *Festuca ovina*, the diploid *F. capillata* gave positive results to the extent that a germinable seed was produced. The seedling failed to become an established plant.

"With the tetraploid *F. heterophylla*, *F. capillata* gave a fully established F_1 hybrid plant.

"With *F. rubra* (presumably hexaploid) the result for *F. capillata* is regarded as completely negative.

"With *F. pratensis* (diploid), *F. capillata* gave stimulated ovaries but no germinable seed.

"With *Lolium perenne* (diploid), *F. capillata* also gave stimulated ovaries.

"With *L. rigidum* (diploid), *F. capillata* gave caryopses that were more developed than those with either *F. pratensis* or *L. perenne*.

"With *L. loliaceum* (diploid), *F. capillata* gave fully established F_1 hybrid plants."

[Author's summary].

2068 JENKIN, T. J.

Interspecific and intergeneric hybrids in herbage grasses. XIII. The breeding affinities of *Festuca heterophylla*.

J. Genet. 1955 : **53** : 112–17.

"*Festuca heterophylla* ($2n = 28?$) has given fully established F_1 hybrid progeny from crosses with: *F. capillata* ($2n = 14$), *F. rubra* ($2n = 42?$), *Lolium perenne* ($2n = 14$).

"Embryos were produced when *L. loliaceum* ($2n = 14$) was pollinated by *F. heterophylla* but the seeds failed to germinate.

"Caryopses were produced but embryos could not be identified when *F. heterophylla* was intercrossed with: *F. pratensis* ($2n = 14$), *F. vaginata* (?), *F. arundinacea* ($2n = 42$), but the seeds failed to germinate.

"*F. heterophylla*, therefore, has some degree of breeding affinity with at least seven other district* types in the genera *Festuca* and *Lolium*, including both fine-leaved and broad-leaved fescues, and therefore provides another link between the fine-leaved fescue types and one another, between these types and the broad-leaved fescues, and between the genera *Festuca* and *Lolium*." [Author's summary].

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* ? distinct.

2069 Jenkin, T. J.

Interspecific and intergeneric hybrids in herbage grasses. XIV. The breeding affinities of *Festuca ovina*.

J. Genet. 1955 : **53** : 118–24.

"When the tetraploid *Festuca ovina* was intercrossed with the diploid *F. capillata*, the single seedling that was obtained failed to survive.

"In one intergeneric cross with the diploid *Lolium loliaceum*, ovary stimulation was high when the *Lolium* was the pistillate parent, but none of the seeds germinated.

"In a parallel intergeneric cross with *L. perenne* hybrid seedlings survived up to the third leaf stage, but none became fully established plants.

"With the tetraploid *F. ovina* as the pistillate parent and the hexaploid *F. rubra* as the pollen parent established F_1 hybrid plants were obtained.

"The *F. ovina* ♀ x *F. rubra* ♂ F_1 hybrids were successfully backcrossed to both parental species." [Author's summary].

2070 Jenkin, T. J.

Interspecific and intergeneric hybrids in herbage grasses. XV. The breeding affinities of *Festuca rubra*.

J. Genet. 1955 : **53** : 125–30.

The original results described in the present paper or in previous papers of this series concerning the breeding affinities of *F. rubra* can be summarized as follows, ++ denoting established F_1 hybrids; +, seedlings failing to survive; ±, caryopses produced but seeds failed to germinate; and —, no caryopses produced: *F. rubra* x *F. arundinacea*, ++; *F. arundinacea* x *F. rubra*, ±; *F. rubra* x *F. pratensis*, ±; *F. pratensis* x *F. rubra*, ±; *F. rubra* x *F. capillata*, —?; *F. rubra* x *F. heterophylla*, ++; *F. heterophylla* x *F. rubra*, +; *F. rubra* x *F. ovina*, ±; *F. ovina* x *F. rubra*, ++; (*F. ovina* x *F. rubra*) x *F. rubra*, ++; (*F. ovina* x *F. rubra*) x *F. ovina*, ++; *F. loliacea* x *F. rubra*, ±; *L. temulentum* x *F. rubra*, ±; *F. rubra* x (*L. rigidum* x *L. perenne*), —; *F. rubra* x *L. perenne*, ±; *L. perenne* x *F. rubra*, ++; (*L. perenne* x *F. rubra*) x *F. rubra*, —; (*L. perenne* x *F. rubra*) x *L. perenne*, —.

2071 Freter, L. E. & Brown, W. V.

A cytotaxonomic study of *Bouteloua curtipendula* and *B. uniflora*.

Bull. Torrey bot. Cl. 1955 : **82** : 121–30.

The distribution, morphology, cytology and reproductive behaviour of the above species are described and their diagnostic characters tabulated. Both species appear to have a basic chromosome number of $x = 10$, *B. uniflora* being a sexually reproducing diploid with regular meiosis and *B. curtipendula* a polymorphic polyploid complex showing regular and irregular meiosis and including apomictic forms. It is suggested that tetraploid forms of the latter species have arisen through segmental allopolyploidy involving at least two species, possibly *B. uniflora* and a *B. radicosa* type, and have subsequently given rise to a complex of allopolyploids and autopolyploids.

2072 Atkins, M. D.

Blackwell switchgrass proves outstanding in leafiness and in total forage produced.

Seed World 1954 : **75** : No. 7 : 44–45.

A strain of switchgrass, named Blackwell in 1944 and developed at the Soil Conservation Service Nursery, Manhattan, Kans., from seed collected from a single plant neat Blackwell, Okla., has given outstandingly good results in Kansas.

2073 Fairbrothers, D. E.

Relationships in the *Capillaria* group of *Panicum*.

Diss. Abstr. 1954 : **14** : Publ. No. 9913 : 1898–99.

Data were obtained on the morphological, ecological and cytological variation and also the geographical distribution of members of the *Capillaria* group, with a view to elucidating interspecific relationships. The basic chromosome number of the group is 9, *P. stramineum* ($2n = 36$) and *P. miliaceum* ($2n = 49+$) being the only polyploid species. Of the 11 species assigned to *Capillaria*, *P. cayennense* is regarded as the most primitive species and *P. lithophilum* the most highly evolved. Isolating mechanisms which have apparently been involved in the speciation of the group are discussed.

2074 de Wet, J. M. J.

Stomatal size as a cytological criterion in *Danthonia*.

Cytologia, Tokyo 1954 : **19** : 176–81.

From a study of 24 species of *Danthonia* whose chromosome numbers were already known it was concluded that stomatal length alone does not constitute a satisfactory criterion for predicting the chromosome number of species represented only by herbarium specimens. When the species were grouped according to anatomical characteristics and countries of origin, however, a correlation between stomatal size and degree of polyploidy became evident. Predictions of chromosome number are made for a number of species.

2075 Church, G. L.
Interspecific hybridization in eastern *Elymus*.
Rhodora 1954 : **56** : 185–97.

Hybrids between all the four species *E. wiegandii*, *E. riparius*, *E. virginicus* and *E. canadensis* have been obtained experimentally, that between the first two species mentioned resembling a form discovered growing wild along Otter Creek, Rutland Co., Vermont.

E. wiegandii has one or more neocentric chromosomes, in which points of spindle-fibre attachment occur in the subterminal as well as the terminal positions. This characteristic is a useful marker for *E. wiegandii* chromosomes in putative hybrids.

The taxonomic relationship between *E. interruptus* and *E. canadensis* is examined. These two species appear to intergrade. The possibility that the character of setaceous glumes found in the *E. interruptus–E. canadensis* complex has been derived from *Hystrix patula* is discussed. Sterile hybrids were obtained when members of the *Elymus* complex were crossed artificially with *H. patula*.

2076 **(Studies on the rust resistance of cereals. IV. Studies on the resistance of *Agropyron*, *Elymus* and *Bromus* to black and brown rust of wheat).**
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **4** : No. 1 : 31–36. [Japanese].

In continuation of the research summarized in Abst. 304, numerous species of the above genera were tested for resistance to *Puccinia graminis* var. *tritici* '11' and to two samples of *P. triticina* assigned to biotype groups 1 and 6 respectively. The following forms were highly resistant to *P. graminis*: *A. ciliare*, *A. cristatum*, *A. elongatum*, *A. intermedium*, *A. kamoji*, *A. riparium*, *A. smithii*, *E. mollis*, *E. virginicus* var. *intermedius* and numerous species of *Bromus*. All the *Agropyron* and *Elymus* species tested for resistance to both of the samples of *P. triticina* were resistant, as were the *Bromus* species tested for resistance against the sample assigned to biotype group 6.

LEGUMINOUS FORAGE PLANTS

Graumann, H. O.
Report of the Fourteenth Alfalfa Improvement Conference, Davis, California, August 3-7, 1954 : Pp. 68. (Mimeographed).

2077 *Bolton, J. L. Summary report of developments in alfalfa improvement in Canada. (pp. 2–4).*

A brief outline of work on varietal adaptation, breeding, cytology and genetics in Canada is included.

2078 *Battle, W. R. Summary report of 1953 Eastern Regional Conference Group. (pp. 4–5).*

The uniform testing programme in the eastern region of the USA was among the topics discussed.

2079 *Elling, L. J. Summary report of 1953 Central Regional Conference Group. (pp. 6–8).*

The following were the main subjects considered; methods of evaluating clones; selection of individual clones to be further tested or used as controls; screening tests by "volunteer stations"; types of progeny tests; and utilization of superior clones.

2080 *Stanford, E. H. Summary report of 1953 Western Regional Conference Group. (pp. 8–9).*

H. O. Graumann discussed the proposed "Region of Adaptation Study" in connexion with seed production and also reported briefly on investigations on seed sources.

2081 *Houston, B. R. & Stanford, E. H. The dwarf disease of alfalfa. (p. 29).*

Selections of California Common showing resistance to dwarf virus disease were allowed to intercross naturally to provide the basis for developing California Common 49 (*cf. PBA*, Vol. XXII, Abst. 1990).

2082 *Cormack, M. W. & Hawn, E. J. Crown diseases of alfalfa in western Canada. (pp. 30–31).*

Progress is being made in developing lucerne with combined resistance to winter crown rot and bacterial wilt.

2083 *Smith, O. F. The stem nematode problem in alfalfa. (pp. 33–34).*

Lahontan, a variety resistant to stem nematode (*Ditylenchus dipsaci*) and bacterial wilt, has been released in California and Nevada (cf. Abst. 330).

2084 *Reynolds, H. R. Varietal susceptibility of alfalfa to two species of root-knot nematodes. (p. 34).*

A full version of this article is summarized in Abst. 2096.

2085 *Fortmann, H. R. The evaluation of alfalfa varieties for use and adaptation in the northeast. (pp. 35–37).*

The results of tests of the synthetic A–225, Atlantic, Buffalo, Narragansett, Williamsburg and Grimm in the north-eastern region of the USA are reported. Narragansett gave an outstandingly good performance for the three-year harvest period.

2086 *Graumann, H. O. & Kehr, W. R. The performance of two-clone and multiple-clone combinations in advanced generations. (pp. 37–39).*

In tests in Nebraska, first generation progenies of synthetics have been much more productive than subsequent generations. Use of syn-1 seed is therefore considered to be inadvisable for critical evaluation of forage yield. The data did not permit a critical analysis regarding the effect of different numbers of parental clones on the forage yields of synthetics.

2087 *Heinrichs, D. H. Creeping rooted alfalfa and its significance. (pp. 40–42).*

Breeding for the habit of creeping roots and the value of this character in developing lucerne for the Canadian Prairies are discussed.

2088 *Adams, M. W. On the effect of selection intensity with respect to discrimination among clones. (yp. 43–44).*

The problem of discrimination of parents selected for a given character, by means of data on their intercross progeny, is examined with reference to the factors influencing the intensity of selection and thus the magnitude of the genetic variance of the intercrosses.

2089 *Stanford, E. H. & Houston, B. R. The backcross technic as a method of breeding alfalfa. (pp. 44–45).*

The application of the back-cross technique is illustrated by an outline of the procedures used in developing the disease-resistant lucerne Caliverde (cf. *PBA*, Vol. XXIV, Abst. 1142).

2090 *Henderson, R. G. Report of the Committee on Screening Alfalfa Breeding Stocks. (pp. 49–53).*

Improved techniques of screening breeding stocks for seed-producing ability, winter hardiness and resistance to black stem (*Ascochyta imperfecta*), winter crown rot, stem nematode and bacterial wilt are suggested.

2091 *Graber, L. F. Report of Committee for Release of New Varieties. (pp. 54–56).*

Vernal (cf. *PBA*, Vol. XXIII, Abst. 2008) and Lahontan (cf. Abst. 330), approved for official release by the Alfalfa Improvement Conference, are described.

2092 LESINS, K.
Techniques for rooting cuttings, chromosome doubling and flower emasculation in alfalfa.
Canad. J. agric. Sci. 1955 : **35** : 58–67.

Chromosome doubling may be achieved by soaking seedlings or rooted cuttings in an inverted position in 0·07% aqueous colchicine solution for 6 hours at room temperature.

Anthers may readily be removed from opened flowers which have been immersed for 4–6 seconds in 57% alcohol and then soaked in water for 15 to 30 minutes.

2093 ZALESKI, A.
Identification and classification of lucerne "strains."
J. nat. Inst. agric. Bot. 1954 : **7** : 131–41.

The conclusions drawn in an earlier, fuller account of the work here described (cf. *PBA*, Vol. XXIV, Abst. 2094) remain unaltered by the inclusion of additional data from 1953.

2094 JULÉN, G.
du Puits-lucernenes odlingssäkerhet. Några kommentarer till de senare årens försöksresultat. (**Reliability of cultivation of du Puits lucerne. Some comments on the results of trials in recent years**).
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : p. 35.

The Flemish variety du Puits outyields Grimm in southern and south-eastern Sweden. It is not recommended for northern or central Sweden as it is inferior to Grimm in respect of winter hardiness.

2095 TARASOVA, T. L. & HRYČEVA, G. P.
[**Seed production of *Medicago tianschanica* (form "Karatau") under Moscow conditions**].
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1954 : No. 17 : 17–21. [Russian].

Methods of improving the seed yield of the above strain, introduced into the Moscow area from the Nonchernozem Belt in Central Asia, are discussed and the results of recent trials presented.

2096 REYNOLDS, H. W.
Varietal susceptibility of alfalfa to two species of root-knot nematodes.
Phytopathology 1955 : **45** : 70–72.

In tests of ten lucerne strains conducted in the greenhouse and under field conditions in Arizona, two selections of the variety African proved highly susceptible to both *Meloidogyne javanica* and *M. incognita* var. *acrita*. With the exception of Narragansett, the hardy northern selections were more susceptible than the less hardy southern selections. Three Chilean selections were moderately resistant to *M. incognita* var. *acrita* but rather susceptible to *M. javanica*. Under greenhouse conditions the latter species was more damaging than the former to most varieties.

2097 Ronningen, T. S. & Hess, A. G.
Relationship between stand and yield in alfalfa variety comparisons.
Agron. J. 1955 : **47** : 92–93.

The results from trials in Maryland have indicated in most cases a close relationship between stand counts and yield when estimated in the third year of harvesting. Although some varietal tests in which yield is determined directly require to be carried out, it is suggested that auxiliary tests of stand only would provide a useful means of indirectly checking yielding capacity. With such stand tests, results could be obtained with the minimum of expense from a greater number and diversity of localities in a restricted period of time.

2098 Metzger, R. J. & Leng, E. R.
A smear technic for some species of Leguminosae.
Stain Tech. 1955 : **30** : 41–42.

Carnoy's No. 2 fluid modified by saturation with mercuric chloride was found to be an effective killing and fixing agent for microsporocytes of *Trifolium pratense*, *T. incarnatum*, *T. repens*, *T. hybridum* and *Glycine max*.

2099 Hiraishi, K., Koike, K. & Hirose, M.
(On the kinds of bee visiting red clover in the Nasu district and on the percentage fruit set of red clover).
Kanto Tosan Nogyo Shikenjo Kenkyu Hokoku/J. Kanto-Tosan agric. Exp. Sta. 1954 : No. 5 : 65–69. [Japanese].

Bees pertaining to nine different genera were observed visiting red clover flowers. The most effective pollinators appeared to be *Eucera difficilis*, *Tetralonia nipponensis* and *Bombus* spp.

2100 Scheibe, A. & Bruns, A.
Eine kurzröhrige weissblühende Mutante bei *Trifolium pratense* nach Röntgenbestrahlung. **(A white-flowering mutant of *T. pratense* with a short corolla obtained by X irradiation).**
Angew. Bot. 1953 : **27** : 70–74.

Mutants obtained at the Max Planck Institute for Breeding Research, Neuhof, Germany, by X irradiation of dry seeds of Lembkes Rotklee [Lembke's Red Clover] included a white-flowering form with a corolla tube only two-thirds the length of that of the parent variety. This shortened corolla will facilitate fertilization by the honey bee.

2101 Bruns, A.
Die Auslösung von Mutationen durch Röntgen-bestrahlung ruhender Samen von *Trifolium pratense*. **(The induction of mutations through X irradiation of dormant seeds of *T. pratense*).**
Angew. Bot. 1954 : **28** : 120–55.

Investigations on the X_1–X_2 generations of a sample of Lembkes Rotklee [Lembke's red clover] subjected to doses of 1000–200,000 r are reported. The mutants obtained included chlorophyll and floral pigmentation deficiencies, leaf abnormalities, dwarf and giant plants, and strongly pubescent forms. The frequency of chlorophyll deficiencies increased with the dose. One mutant of potential interest to breeders was a white-flowered type with a short corolla tube (7·07 mm.) which should facilitate fertilization by bees. (cf. Abst. 2100).

2102 Daday, H.
Gene frequencies in wild populations of *Trifolium repens*. II. Distribution by altitude.
Heredity 1954 : **8** : 377–84.

In a study of *T. repens* populations from the Central European Alps a gradual decrease was found in the frequency of *Ac* for production of the glucoside lotaustralin and of *Li* for linamarase formation, as the altitude increased (cf. *PBA*, Vol. XXIV, Abst. 3082). This decrease in the frequencies of both genes was correlated with the decrease in the January mean temperature with increasing altitude. The variation detected in the amounts of the enzyme and glucoside outputs determined by *Li* and *Ac* appeared to be positively correlated with the frequencies of these dominant alleles in the populations.

Lotaustralin and linamarase production may each be affected by a system of modifiers. Both the differences in gene frequency and gene output among the populations are considered to be due to natural selection.

2103 Wiklund, K.
Svalöfs original Kurir-alsike. **(The Svalöf original Alsike clover Kurir).**
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : 23–25.

Kurir [Courier] was selected at the West Norrland branch of the Swedish Seed Association from a strain of Brynge. It is hardy, tolerant of grazing and has a long period of dormancy. In trials in Norrland from 1940 to 1952, its yields in second and third leys were considerably higher than those of any other variety although, in the first ley, it proved inferior to other varieties.

2104 HERTZSCH, W.
Beobachtungen an künstlich hergestellten polyploiden Futterpflanzen. 2. Schwedenklee (*Trifolium hybridum*). [**Observations on artificially produced polyploid forage plants. 2. Alsike clover (*T. hybridum*)**].
Z. Pflanzenz. 1954 : **34** : 59–70.

Tetraploid forms of a German land race and an American land race were obtained at the Max Planck Institute for Breeding Research, Voldagsen, Germany, by immersing the growing shoots in a 0·05% colchicine solution for 24 hr. The tetraploid plants yielded considerably less seed than the diploid control, produced less green matter, and had a lower dry-matter content. The proportion, in weight, of leaves to stalk was higher in $4n$ plants. The thousand seed weight of $2n$ and $4n$ forms was 0·73g. and 1·12g. respectively. When self-pollinated, the $4n$ plants proved highly self incompatible; the progeny of crosses between tetraploids and diploids included some triploids. Selection to increase the seed set and yield of the tetraploid strains is to be undertaken.

2105 ROSSITER, R. C.
Strain reaction to potassium deficiency in subterranean clover (*Trifolium subterraneum* L.).
Aust. J. agric. Res. 1955 : **6** : 9–14.

Five commercial strains tested in respect of yield, dry matter and potassium content in field and pot experiments at Perth, Western Australia, did not differ significantly either in their reaction to potassium deficiency or in their response to applied potassium.

2106 YAMAMOTO, K.
(On the F_1 of *Vicia sativa* L. x *V. tetrasperma* Moench.).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **4** : No. 1 : 21–24. [Japanese].

A description is given of the F_1 hybrid of the above cross. The most frequent configuration at meiosis was $1_{III} + 5_{II}$; fertility was quite good.

2107 KATAYAMA, Y. & NAGATOMO, T.
(Investigations on recently developed crops. I. Lupin).
Miyazaki Daigaku Jiho (Shizenkagaku)/ Bull. Miyazaki Univ. (Nat. Sci.) 1953 : No. 4 : 85–88. [Japanese].

Data are provided on the botanical characteristics and fresh and dry weights of the different parts of *Lupinus luteus* (common and sweet strains) and of *L. albus*. F_2 segregation figures for alkaloid content in the cross between the common and sweet strains of *L. luteus* are also given.

2108 SHAMA RAO, H. K.
Chromosome numbers in some species of the genus *Alysicarpus* Neck.
Curr. Sci. 1954 : **23** : 361–62.

The chromosome number $2n = 16$ is reported for the six Indian species *A. bupleurifolius*, *A. longifolius*, *A. monilifer*, *A. pubescens*, *A. rugosus* and *A. vaginalis*.

2109 HERTZSCH, W.
Beobachtungen an künstlich hergestellten polyploiden Futterpflanzen. 1. Serradella (*Ornithopus sativus*). [**Observations on artificially produced polyploid forage plants. 1. Serradella (*O. sativus*)**].
Z. Pflanzenz. 1954 : **34** : 49–58.

At the Max Planck Institute for Breeding Research, Voldagsen, Germany, tetraploid forms of *O. sativus* were obtained by immersing germinating seeds in a 0·05% colchicine solution. The $4n$ plants had fewer and shorter stems and fewer leaves than the $2n$, but the stems were thicker and the leaves broader. The tetraploids yielded less green matter than the diploids and had a slightly lower protein content. The thousand-seed weight of diploids and tetraploids was 3·6 g. and 6·2 g. respectively. Selection is being carried out to improve the seed set of the $4n$ strains, which are considerably less fertile than the $2n$.

ROOTS AND TUBERS

2110 JÄHNL, G.
Ergebnisse der Rübenversuche des Jahres 1953. (**Results of beet trials during 1953).**
VersErgebn. Bundesanst. alp. Landw., Admont 1954 : No. 25 : Pp. 52. (Mimeographed).

Of the 36 varieties of sugar beet included in these trials, Beta 242/53, Buszczinski CLR, Kleinwanzleben E and Hilleshög T proved the most satisfactory in yield and sugar content. Beta K01 and Beta K91 suffered the least damage through attack by *Cercospora* sp. Among the mangels, Corona and URSUS gave the highest yields. Corona was fairly resistant to *Cercospora*, while URSUS suffered moderate damage.

2111 Carlson, G.
Färgen och stocklöpningen är viktigast hos rödbetorna. (**Colour and bolting are most important in garden beets**).
Våren 1955. Hammenhögs, Otto J. Olson & Sons AB : 3–5.

The occurrence of different colours in varieties and strains of beet, colour defects and the way in which colour and quality may be affected by poor soil, drought and temperature are mentioned. The hereditary tendency to bolting is probably favoured by the local climate in varieties and strains from southeastern Europe. Early sowing followed by a cold spell also often induces bolting.

Results obtained during 1944–52 at Alnarp, Hammenhög and the Gullåker Plant Breeding Institute are cited, showing the performance of different varieties and strains of beet in tests for bolting and colour. Egyptisk plattrund [Oblate Egyptian] OJO/51, Detroit OJO/51 and Claudia OJO/51 are mentioned for their low bolting frequency and the attractive appearance and quality of their roots.

2112 **Strains of fodder beet and mangel.**
Fmrs'. Leafl. nat. Inst. agric. Bot. 1954 : No. 6 : Pp. 6.

Information is given on the strains of forage beet and mangel suitable for cultivating in Britain.

2113 **A report on three years' experimentation with fodder-root varieties 1951 to 1953.**
Tech. Bull. Edinb. Coll. Agric. 1954 : No. 12 : Pp. 10.

The results of trials carried out on forage-beet varieties in comparison with swede and mangel in the east of Scotland during 1951–53 are summarized.

2114 Opsahl, B.
Forsøk med stammer av fôrbeter 1950–1953. (**Trials of mangel varieties, 1950-1953**).
Forskn. Fors. Landbr. 1954 : **5** : 525–45.

Data on trials of 13 Danish and three Swedish strains carried out in southern Norway are presented. The Danish variety Gul Dæno [Yellow Dæno] outyielded all others and produced the lowest percentage of bolters.

2115 Statens forsøg med stammer af foderroer. (**National trials of strains of forage roots**).
Medd. Forsøksv. Plantek. Kbh. 1954 : No. 522 : Pp. 3.

Yield tables and illustrations are given for the nine varieties of forage beets and the eight varieties of swede which were awarded first class rank in trials of 23 beets and 15 swedes carried out in Denmark during the periods 1950–53 and 1946–49. The swede Øtofte X & E showed good resistance to club root.

2116 Voederbieten, 1955. (**Mangels, 1955**).
Landbouwvoorlichting 12 : Bijl. 4; Ber. Rassenkeuze 1955 : No. 183 : Pp. 5.

Tabulated data on yield of root, leaf and dry matter, dry matter content, tendency to bolting, keeping quality and suitability for mechanical harvesting are presented for the 47 varieties at present cultivated in the Netherlands, as well as for 17 new varieties still under observation. The information given is based on trials conducted at a number of centres and on different types of soil.

2117 Josefsson, A.
Resultat från försök med tetraploida rovor vid Sveriges Utsädesförening. (**Results of experiments with tetraploid turnips at the Swedish Seed Association's plots**).
Svensk JordbrForsk. Årsb. 1954 : 108–13.

The yield of roots, tops and dry matter is shown in tables recording the performance of tetraploid and diploid forms of Östersundom, Bortfelder, Yellow Tankard and Sirius (cf. *PBA*, Vol. XXIV, Abst. 2127) in trials conducted by the Swedish Seed Association during 1948–52. Some information is also given on the dry matter content and its chemical composition in the $2n$ and $4n$ forms and on their germination capacity and 1000 corn weight.

Some slight evidence from two severe outbreaks of club root suggests that the tetraploids may possibly be somewhat more resistant than the diploids to club root. Though the roots of tetraploids were more severely attacked by bacterial disease in an experiment at Riseberga, it is not yet possible to reach any definite conclusion about their susceptibility as compared with diploids.

2118 Persson, A. R. & Vik, J.
Forsøk med skandinaviske stammer av matnepe 1951–1953. (**Trials of Scandinavian strains of table turnip 1951-53**).
Forskn. Fors. Landbr. 1954 : **5** : 579–607.

In Norwegian trials of 14 varieties, the Milan strains were earliest and showed the greatest resistance to club root, the most resistant being Sola LoG and Milan Hunderup P48. Resistance to cabbage root fly was greatest in the Milan group, but the Munich varieties Målselv Aasvejen and Petrowsky Vangede P1948 were also highly resistant. Munich varieties were generally of better quality.

2119 Josefsson, A.
Svalöfs original Viktoriakålrot. (**The swede Svalöf original Viktoria**).
Sverig. Utsädesfören. Tidskr. 1954 : **64** : 370–75.

By subjecting plants from a cross between the swedes Sv016 and Balder to repeated selection and crossing during a series of years a number of similar families were obtained; and from a combination of the best of these the above new Viktoria swede was obtained. It is a green-topped type, closely resembling the old Sv. Gul Svensk kålrot [Sv. Yellow Swedish swede], the flesh of the root being yellow with a bronze tint. The roots, which have a high dry matter content, are almost spherical but slightly elongated, with a short neck. Their flavour is good and they are suitable for fodder or table use. The dark-green foliage has a blue bloom. Resistance to mildew is relatively good. Tables are given showing the performance of Viktoria in comparative trials with other Swedish varieties.

2120 Josefsson, A.
Svalöfs original Viktoria, en ny kålrot. (**A new Svalöf original swede, Viktoria**).
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : 33–35.

This new variety was obtained from a cross between Weibull's Balder and the Svalöf line **016**. It produces a higher yield of roots and dry matter than Svalöfs Gul Svensk [Svalöf Yellow Swedish], which it is intended to replace, and is suitable both for fodder and culinary purposes (cf. Abst. 2119).

2121 Kartoffelsorten zur Auswahl. (**Potato varieties which may be chosen**).
Mitt. dtsch. LandwGes. 1955 : **70** : 146–49.

Tabulated data are presented on the yield, starch content, soil requirements, shape and colour of tuber and susceptibility to disease of varieties included in the West German official list.

2122 Achtzehnter Tätigkeitsbericht der Vereinigung Schweiz. Versuchs- und Vermittlungsstellen für Saatkartoffeln (V.S.V.V.S.) vom 1.November 1953 bis 31.Oktober 1954. [**Eighteenth report on the activities of the Association of Swiss Experimental Stations and distributive agencies for seed potatoes (VSVVS) from 1 November 1953 to 31 October 1954**] : Pp. 42.

This report includes an account of the potato-growing industry in Switzerland and information on the distribution of varieties in the French-speaking and German-speaking parts of the country, respectively. Bintje is still the variety most widely cultivated and is steadily gaining ground at the expense of all others. Observations are made on recent changes in the Swiss official list of approved varieties, while an appendix provides tabulated data on the yields, disease resistance, average size of tuber, cooking quality and starch content of the varieties most widely cultivated in Switzerland as well as of several new varieties and introductions from abroad.

2123 Beránek, J.
Rayonisace odrůd a rayonisační pokusy s brambory. (**Regional standardization of varieties and standardization experiments with potatoes**).
Za socalist. Zeměd. 1955 : **5** : 193–202.

The procedure for testing new varieties in Czechoslovakia is outlined and some recent standards, notable for their high tuber yields, good flavour and high starch contents, are listed. Bintje and the new wart-resistant variety Ambra are among the best early forms grown for the table. The late and midseason standards grown for human consumption and fodder are dealt with separately from those cultivated for industrial uses. Český Triumf [Czech Triumph] is outstanding for its high yield among the fodder varieties and Kotnov and Parnassia are described as the best industrial strains.

2124 Virnes, E.
Eräiden varhaisperunalajikkeiden satoisuddesta. (**On the productiveness of particular early potato varieties**).
Koetoim. ja Käytäntö 1954 : p. 16.

Data for the yielding capacity of several native Finnish and foreign early potato varieties are given, from experiments conducted during 1947–53 at the Agricultural Station at Tikkurila. Ta. aikainen [Early Ta.] was used as the standard. The highest yielding varieties were Jaakko and Siikli. Jaakko, however, is prone to wart and not recommended for southern and central Finland.

2125 Tedin, O.
Sortfrågor och förädlingsproblem hos potatis. (**Variety questions and breeding problems concerning potatoes**).
Svensk JordbrForsk. Årsb. 1954 : 71–75.

The relative importance of yield, haulm development at harvest time, quality and size of tubers, disease resistance and starch content is considered from the breeder's standpoint and with reference to the needs of Swedish growers of table or industrial potatoes.

The association between low tuber quality and the largely unknown biochemical factors determining

Phytophthora resistance may be due to an indissoluble relationship between these factors and certain chemical substances adversely affecting quality.

The possibility is suggested of improving the collection of potato varieties, available in Sweden, by breeding for a combination of the high quality of the Swedish Class I varieties with the yield and disease resistance found in Ackersegen.

2126 Forsøg med kartoffelsorter 1951–53. Foreløbig meddelelse. (**Trials of potato varieties 1951-53. Provisional report**).
Tidsskr. Planteavl 1955 : **58** : 545–48.

The results of trials of six medium early and six late varieties at four stations in Denmark are reported. Of the former, Bintje was highest in quality and Craig's Defiance and Arran Banner highest in total yield; of the latter, Dianella was superior to all others in percentage dry matter and in total dry matter yield. All varieties except Bintje, Katahdin and Tylstrup 38089 were immune to wart, while Gloria and Tylstrup 38089 were least damaged by blight.

2127 Zingstra, H.
Some data and figures on potato breeding in the Netherlands.
Euphytica, Wageningen 1954 : **3** : 229–32.

An analysis is given of (1) the numbers of private breeders and organizations engaged in potato improvement during the period 1936–54 and (2) the numbers of first-year seedlings, true seeds and glasshouse clones distributed during this period. Factors regarded as responsible for the expansion of potato-breeding in the Netherlands during these years are indicated.

2128 Aardappels, 1955 (Observatieproefvelden). [**Potatoes, 1955 (Observation experimental fields)**].
Landbouwvoorlichting 12 : Bijl. 3; Ber. Rassenkeuze 1955 : No. 182 : unpaginated.

Data on yield, maturity, quality, dry matter percentage and disease resistance are presented for some of the main varieties cultivated in the Netherlands, as well as for a number of new varieties and a few recent introductions from Scotland and Germany.

2129 Keller, E. R.
Augusta und Benedikta, zwei neue Kartoffelsorten im Schweizerischen Richtsortiment. (**Augusta and Benedikta, two new potato varieties in the Swiss approved variety collection**).
Mitt. schweiz. Landw. 1955 : **3** : 42–44.

Both varieties are of German origin, are intended for industrial utilization and have a high starch content. Augusta (Bona x Sämling [Seedling]) is highly productive, matures slightly earlier than Bintje, displays resistance to wart and is moderately resistant to late blight and virus diseases. It is susceptible to scab. Benedikta (Aquila x Sämling) matures at the same time as Voran, gives high yields of flattish, large oval tubers and is fairly resistant to wart and late blight. It is somewhat susceptible to virus diseases. Both Augusta and Benedikta yield well on soils of medium or low fertility.

2130 **What's new in farming.**
Indian Fmg. 1954 : **4** : No. 8 : p. 25.

Three hybrid potato selections numbered 2186, 2236 and 2253 respectively are available for limited trials by growers. Developed at the Simla Potato Breeding Substation, they have given a good performance in trials in the northern and southern plains of India and are fairly resistant to viruses.

Abstracts of papers presented at the Annual Meeting of the Potato Association of America, Estes Park, Colorado, August 25, 26, 27, 1954.
Amer. Potato J. 1954 : **31** : 366–81.

The following papers of interest to plant breeders are reported.

2131 *Beamish, K. The effect of pollen aging on seed development in* Solanum. (*p. 266*).

Deterioration of pollen was found to be less rapid under refrigeration than at room temperature. Although the germination of old pollen was normal and fertilization was effected, seeds frequently failed to mature because cell division in the embryo and endosperm ceased before development had been completed.

2132 *Ferris, V. R. & Peterson, L. C. Histological study of suscept-pathogen relationships between* Solanum demissum *Lindl. derivatives and* Phytophthora infestans (*Mont.*) *deBary.* (*pp. 367–68*).

The inoculation of plants duplex for a given resistance gene with races pathogenic to plants simplex for the same gene resulted in lesions which differed in appearance from those found in typically resistant or susceptible plants. A duplex plant showed susceptibility to inoculation with a culture reisolated after serial passages through a plant of the same genotype.

2133 *Graham, K. M. Distribution of races of* Phytophthora infestans (*Mont.*) *de Bary in Canada.* (*p. 368*).

During 1952 and 1953, some 75 isolates of *Ph. infestans* were obtained from diseased potato tubers and tomato fruits received from the ten provinces of Canada. Only races 0 and 4 were isolated from commercial potato varieties lacking genes for resistance, while races 1, 1.2, 1.4 and 1.2.4 were found on varieties such as Canso, Keswick, Placid and Kennebec, which carry one or more resistance genes. Races 0 and 4 were both isolated from tomatoes, while a third race, which behaved like race 0 on the potato differentials and was designated 1(T), was obtained from Snowflake potato, from the tomato variety Rutgers and from a cherry tomato carrying a single gene for resistance to races 0 and 4 and to all other races so far obtained from potato. Isolates of 0, 1, 4, 1.2 and 1.2.4 all attacked Stokesdale tomato.

2134 *Hougas, R. W. & Ross, R. W. The use of foreign introductions in the breeding of US potato varieties. (p. 369).*

Of the 62 varieties released under state and federal breeding programmes, all but six have one or more introductions in their pedigrees. The characters so far contributed by a total of 24 introductions include increased male fertility and resistance to important diseases such as scab and late blight. Further introductions now being used in breeding possess such desirable characters as resistance to southern bacterial wilt, nematode, virus X, virus Y, leaf roll and frost.

2135 *Howatt, J. L. & Grainger, P. N. Some new findings concerning* Phytophthora infestans. *(pp. 369–70).*

The use of a full set of Black's differentials has confirmed the presence of race 1.2.3.4 in New Brunswick, Canada. Several races appear to be mixtures, and certain races have produced dissimilar reactions in potato genotypes which, according to the International System, are of equivalent status as differential hosts. There is evidence of heterogeneity and of irregular behaviour of single zoospore cultures on certain hosts.

2136 *Locke, S. B. Vector feeding relative to leafroll resistance in potato varieties. (p. 370).*

No correlation was found between the numbers of aphids and the degree of leaf roll infection on three resistant and two susceptible varieties. There were, however, significant differences in the amount of leaf injury caused by aphid feeding; severe injury was found in two of the resistant strains while little injury occurred in the susceptible varieties and in the third resistant variety.

2137 *Miller, J. C. Selection of desirable somatic mutations, a means of potato improvement. (p. 371).*

The paper here reported is summarized in Abst. 2155.

2138 *Muncie, J. H. Resistance of potatoes to* Verticillium albo-atrum. *(p. 371).*

Plate cultures from tubers of 110 seedlings and eight commercial varieties grown in heavily infected soil under field conditions showed 24 of the former and one of the latter to be free from infection.

2139 *Ochoa, C. Northern Peru, a possible new source of potatoes resistant to* Phytophthora infestans. *(p. 371).*

The north Peruvian species *Solanum chiquidenum* sp. nov. (inedit.) and *S. piurae* were found to be immune to races 0, 1, 4, 1.4 and 2.4 of *Ph. infestans*. A collection of more than 400 samples of cultivated, wild and weed potatoes from northern Peru is being maintained at Huancayo, Peru.

2140 *Peterson, C. E. Selection of greenhouse-grown seedling potatoes upon specific gravity and tuber characters. (p. 372).*

Four classes of seedling tuber shapes were distinguished: pearshaped, pointed, irregular and acceptable. The percentage of tubers of acceptable shape produced by these classes in the first year hills were, respectively, 34.3, 43.1, 62.0 and 75. Tuber shape was therefore considered to be unreliable as a basis for selection, as were also skin characters and specific gravity.

2141 *Rieman, G. H., Cooper, D. C. & Young, D. A. Blondy, a yellow-green somatic mutation in the Chippewa potato. (p. 374).*

This yellow-green mutant, 64 clonal lines of which were kept under observation over a period of five years, showed a mosaic type of pigmentation with a variable proportion of green leaf area, occasional plants being entirely green. It was inferior in yield to the normal green parental strain, had abnormal stomatal development and did not breed true.

2142 *Werner, H. G. Enhancing blooming by preventing the formation of tubers. (p. 375).*

The removal of all the lateral buds from plants grown at day and night temperatures of 70–75° and 50–60° F., respectively, and exposed to 20-hour photoperiods produced a marked improvement in the number and size of the flowers and in the quantity and quality of pollen. Cross pollination resulted in high fruit set, the berries being larger and containing more seeds than usual.

2143 *Pristou, R. & Gallegly, M. E. Differential hosts to foreign and domestic physiologic potato races of* Phytophthora infestans. (*p. 372–73*).

In comparative trials of the potato differentials and *Ph. infestans* races reported by Black in Scotland, Mastenbroek in the Netherlands and Mills and Peterson in the USA, the differentials contained the four genes R_1, R_2, R_3 and R_4, either singly or in various combinations, and the pathogen isolates fell into ten groups which were identified with the international races 0, 1, 2, 4, 1.2, 1.4, 2.4, 1.2.4, 1.3.4 and 2.3.4. Three Canadian isolates were found to be races 1.2.3, 1.2.4 and 1.2.3.4.

2144 *Castronovo, A., Thurston, H. D. & Eide, C. J. Parasitic aggressiveness and its relation to late blight tolerant potato varieties and the survival of the pathogen.* (*pp. 366–67*).

Differences have been found between different races of *Phytophthora infestans* and between isolates of individual races in their pathogenicity, incubation period and degree of sporulation on nonhypersensitive potato varieties.

2145 *Wilson, J. B. The interrelationship of potato and tomato races of* Phytophthora infestans. (*p. 376*).

Twenty-nine isolates from potato, representing ten different races of *Ph. infestans*, fell into four groups when studied on tomato differentials. Group I was weakly to nonpathogenic on all varieties: group II was pathogenic on the varieties carrying recessive genes but nonpathogenic on the varieties with minor or dominant genes; group III appeared to differ from II only in virulence, being pathogenic on the varieties carrying recessive and minor genes but not on those with dominant genes; group IV was pathogenic on all varieties.

The reactions on the potato differentials of three races isolated from ten tomatoes were similar to those of the international races 0, 3 or 4 from potatoes. Differences in behaviour were found between different isolates of any one race from either potato or tomato.

2146 STEVENSON, F. J., AKELEY, R. V. & BRASHER, E. P.

Delus: A new variety of potato, immune from the common races of the late blight fungus, high in percentage total solids, and adapted to growing conditions in Delaware.

Amer. Potato J. 1954 : **31** : 410–13.

The variety Delus* (Mohawk x USDA Seedling 96–56) has been released in Delaware since it shows late-blight resistance and other improvements over Irish Cobbler and Katahdin. If the tubers are stored for a long period, a temperature below 40° F. should be avoided as the variety tends to develop internal mahogany browning at lower temperatures.

2147 LÓPEZ CAMPOS, G.

Perfeccionamientos holandeses en la selección de nuevas variedades de patata. (**Improvements in breeding new varieties of potatoes in the Netherlands**).

Agricultura, Madr. 1954 : **23** : 637–39.

A brief outline of the methods of potato breeding used in the Netherlands emphasizes the importance of producing two generations a year by the use of temperature control and artificial lighting in the greenhouses.

2148 FERGUSON, I. A. C.

Some potato trials at Matopos Research Station.

Rhod. agric. J. 1954 : **51** : 474–77.

In a trial of the yielding ability and quality of varieties at Matopos, S. Rhodesia, Great Scot, Dr. McIntosh and Up-to-Date were superior to the other 22 varieties tested. With a view to future breeding 33 varieties were tested for their capacity to produce selfed seed under long-day conditions in the greenhouse. Majestic, Dr. McIntosh, Ulster Prince, South American 259/50 and Dunbar Standard set viable seed.

2149 NIEGOLEWSKI, Z.

Możliwości dziedziczenia kształtów kłębów u siewek ziemniaka. (**The possibility of the inheritance of tuber forms in seed potatoes**).

Roczn. Nauk rol. 1954 : **69** : Ser. A. : 309–13.

As a result of his investigations, the author concludes that in selecting seed potato plants those showing defectively shaped tubers, even in small quantities, should not be included, because, even after such tubers have been rejected, the defective characteristic will appear in the progeny and in an even higher percentage of tubers.

2150 DODDS, K. S. & LONG, D. H.

The inheritance of colour in diploid potatoes. I. Types of anthocyanidins and their genetic loci.

J. Genet. 1955 : **53** : 136–49.

The material investigated consisted mainly of *Solanum rybinii*, but *S. stenotomum* and *S. cardenasii* were also used in crosses. Two independent loci, *P* and *R*, are postulated as being responsible for the development of certain anthocyanin pigments in the plant body, i.e. in the tuber, sprout, haulm and flower. It is further suggested that a third locus, I, when in the homozygous recessive condition, is epistatic to P and R and suppresses pigmentation in the tuber only. P determines the production of an acylated glycoside of petunidin. Two alleles of the locus R, designated R and R^{pw}, are hypostatic to P. In the absence of P, R is associated with the presence of an acylated glycoside of pelargonidin in the tuber and sprout only, and of a glycoside of cyanidin in the flower only. Epistasis is however incomplete in the flower, where the glycoside of cyanidin occurs also in the presence of P. Genotypes homozygous for R^{pw} and lacking P contain only peonidin in the tubers and sprouts, the production of this pigment, which is present in all cultivated diploids, being suppressed in the flowers. Mixtures of pigments occur only in cultivated potatoes, the same types of anthocyanins being found in diploid and tetraploid species. It is suggested that the variability in anthocyanin pigmentation was established by human selection at the diploid level, tetraploidy evolving after the domestication of diploid forms.

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* Evidently referred to erroneously as Delhus in a previously published account (cf. Abst. 377).

2151 Marks, G. E.
A polyhaploid plant of *Solanum polytrichon* Rydb.
Nature, Lond. 1955 : **175** : p. 469.

A single polyhaploid plant of *S. polytrichon* with $2n = 24$ was obtained from *S. polytrichon* ($2n = 48$) ♀ x *S. stoloniferum* ($2n = 48$) ♂. It is assumed that the plant arose by haploid parthenogenesis. The plant was chlorotic, an observation in support of its suggested origin since the parental ♀ plant was known to be heterozygous for a single recessive gene for chlorosis. The polyhaploid showed a reduction in leaflet index and stomatal length compared with the normal form, this reduction being the direct consequence of the halved chromosome number and not of the chlorotic condition. The parental plant regularly formed 24 bivalents; in the polyhaploid the mean number of bivalents was $7{\cdot}9 \pm 0{\cdot}55$. It is therefore postulated that *S. polytrichon* is an allotetraploid. The polyhaploid readily develops tubers; even when they are produced, its flowers are completely sterile.

2152 Beamish, K. I.
Seed failure following hybridization between the hexaploid *Solanum demissum* and four diploid *Solanum* species.
Amer. J. Bot. 1955 : **42** : 297–304.

S. demissum produced few or no seeds when pollinated by *S. pinnatisectum*, *S. cardiophyllum*, *S. saltense* and *S. rybinii*. Fertilization occurred after each cross and seed development was initiated but eventually failed to continue because the endosperm did not differentiate. The pattern of seed failure in all the crosses was similar although the rate at which failure occurred varied within and between crosses.

2153 Walker, R. I.
Cytological and embryological studies in *Solanum*, section *Tuberarium*.
Bull. Torrey bot. Cl. 1955 : **82** : 87–101.

Fertilization and seed development in self-pollinated *S. demissum* are described in detail and compared with the abnormal processes occurring in the partially sterile crosses of *S. demissum* with other species. In the cross *S. demissum* x *S. polyadenium* the pollen tubes failed to reach the ovule so that fertilization was not effected. In the other crosses, *S. demissum* x *S. gibberulosum*, *S. demissum* x *S. tarijense* and *S. demissum* x *S. schickii*, fertilization occurred but was delayed; endosperm development was retarded, possibly as a result of the hyperplastic growth of the endothelial cells; and the embryo grew slowly, appeared starved and usually failed to develop beyond a few-celled stage.

2154 Wagenheim, K.-H. v.
Zur Ursache der Kreuzungsschwierigkeiten zwischen *Solanum tuberosum* L. und *S. acaule* Bitt. bzw. *S. stoloniferum* Schlechtd. et Bouché. **(On the cause of difficulties in crosses of *S. tuberosum* L. with *S. acaule* Bitt. and *S. stoloniferum* Schlechtd. et Bouché).**
Z. Pflanzenz. 1954 : **34** : 7–48.

The results of investigations at the Max Planck Institute for Breeding Research, Voldagsen, Germany, are reported. *S. acaule* and *S. stoloniferum* are highly resistant to viruses X and Y, respectively, and the attempt is being made to transfer these characters to cultivated varieties. Tetraploid forms of *S. stoloniferum* proved considerably more difficult to cross with *S. tuberosum* than octoploid forms obtained by colchicine treatment; although numerous berries were formed, they were mostly seedless or contained nonviable seeds. The few plants obtained from this cross had a stunted habit and died after a short time. Crosses of 4*x* *S. acaule* with *S. tuberosum* resulted in a large number of berries, most of which contained 1–4 fertile seeds, in addition to many nonviable seeds. Many of the plants from this cross died at an early stage or were deformed; others, with a chromosome complement of 70–74, grew normally and produced pollen that was 45–85% viable. In the reciprocal cross, the pollen of both tetraploid and octoploid forms of *S. acaule* failed to grow down the styles of *S. tuberosum*. Two hybrids, with $2n = 48$ and 50, respectively, were obtained from *S. tuberosum* x 4*x S. stoloniferum*; both proved sterile. Three plants, with the morphological characters of *S. stoloniferum* and with $2n = 72$, were obtained from the reciprocal cross. All the hybrids of *S. stoloniferum* were highly resistant to virus Y. Embryological studies of the crosses 4*x S. acaule* x *S. tuberosum*, 4*x S. stoloniferum* x *S. tuberosum* and *S. tuberosum* x 4*x S. stoloniferum* revealed a high degree of seed abortion. Five principal reasons for the failure of crosses between cultivated varieties and *S. acaule* or *S. stoloniferum* are postulated: (1) failure of the pollen tube to grow down the style (2) disintegration of the ovules (3) differences in the chromosome numbers of the parents leading to disturbances in meiosis (4) the presence in *S. tuberosum* of homozygous genes that impede fertilization by another species and (5) plasmatic differences between the two parent species.

2155 MILLER, J. C.
Selection of desirable somatic mutations: a means of potato improvement.
Amer. Potato J. 1954 : **31** : 358–59.

The importance of somatic mutation is discussed and some American potato varieties which have arisen in this manner are noted. Procedures for finding desirable mutants are suggested.

2156 PETERS, N.
Zytologische Untersuchungen an *Solanum tuberosum* und polyploiden Wildkartoffel-Arten. (**Cytological investigations on *S. tuberosum* and polyploid wild species of potato**).
Z. indukt. Abstamm.- u. VererbLehre 1954 : **86** : 373–98.

In studies of pachytene nuclei in anthers of *S. tuberosum* 21 out of the 24 chromosomes could be identified and it was evident that only 12 morphologically different types were present, each type being represented twice. Those of *S. andigenum* showed marked resemblances to the 12 basic types of *S. tuberosum*; certain differences in detail observed were of a type that could be found between two varieties of the same species. Secondary pairing was observed in both species though it was not frequent. The two species are thus regarded as closely related and are thought to have arisen by autopolyploidy.

Studies of a number of species in the *Longipedicellata* group showed all 24 chromosomes to be distinct and in these species no secondary pairing was observed. Similarities were observed between the chromosomes of the species *S. antipoviczii*, *S. ajuscoense*, *S. tlaxcalense*, *S. malinchense* and *S. fendleri* and they are regarded as constituting a closely related group which has arisen by allopolyploidy.

The satellited chromosomes showed a strong resemblance in all the above species with the exception of *S. tlaxcalense*, which in the course of evolution has apparently lost an achromatic section in one member of the pair.

2157 GOTTSCHALK, W.
Die Grundzahl der Gattung *Solanum* und einiger *Nicotiana*-Arten. (**The basic number of the genus *Solanum* and some *Nicotiana* species**).
Ber. dtsch. bot. Ges. 1954 : **67** : 369–76.

Cytological studies including observations on chromosome homology and secondary pairing indicate that the two markedly primitive species *S. simplicifolium* and *S. polyadenium* are phylogenetically tetraploid forms and that the basic number for *Solanum* is $x = 6$. The primitive forms of the genus appear to be amphidiploids, judging from the structural morphology of the genomes of the 12-chromosome species that have arisen by allopolyploidy.

Most of the species of *Solanum* are derived from 12-chromosome forms that are already tetraploids.

Since *N. langsdorffii* ($n = 9$) and *N. plumbaginifolia* ($n = 10$) have two satellites in the genome, they are probably hyperdiploids with basic numbers lower than their haploid numbers, i.e. probably 8 for the former species, and 8 or 9 for the latter.

2158 SWAMINATHAN, M. S.
Species differentiation and the nature of polyploidy in certain species of the genus *Solanum*, Sect. *Tuberarium*.
Abstr. Diss. Univ. Camb. 1952–53 (1955) : 8–9.

Cytological observations on interspecific hybrids, autotetraploids and allotetraploids of 25 diploid species suggested that differentiation of the species was mainly genic but that some structural differentiation of the chromosomes was also involved (cf. *PBA*, Vol. XXIV, 2136). *S. acaule*, *S. fendleri* and *S. longipedicellatum* appeared to be allotetraploids and *S. andigenum* and *S. tuberosum* autotetraploids (cf. *PBA*, Vol. XXIV, Abst. 2142). Study of meiosis in haploids of *S. demissum* indicated that this species is a typical allohexaploid. The hexaploid *S. verrucosum* var. *spectabilis* differed markedly from *S. demissum* with respect to at least one genome.

2159 Swaminathan, M. S.
Microsporogenesis in some commercial potato varieties.
J. Hered. 1954 : **45** : 265–72.

Microsporogenesis was studied in the following 12 American commercial varieties: Chippewa, Cobbler, Earlaine, Green Mountain, Houma, Katahdin, Kennebec, Red Pontiac, Russet Rural, Sebago and Triumph. All the varieties were characterized by the formation of trivalents and quadrivalents at diakinesis and metaphase I. Nine quadrivalents were found in a cell at metaphase I in Chippewa, this being the highest number of quadrivalents per cell found in any variety. The maximum number of quadrivalents per cell observed in a colchicine-induced autotetraploid of the diploid species *Solanum polyadenium* was 8. Various meiotic abnormalities and different degrees of pollen abortion were observed, Earlaine and Katahdin having a high percentage of stainable pollen. All the varieties set seed when crossed with Katahdin as male parent. The cytological data obtained suggest that *S. tuberosum* is an autotetraploid.

2160 Schulze, E.
Mechanische Keimanregung, Schosserbildung und photoperiodisches Verhalten bei Kartoffeln. (**Mechanically induced germination, formation of bolters and photoperiodic behaviour in potatoes**).
Z. Acker- u. PflBau. 1954 : **98** : 385–422.

In experiments at Bonn University, mechanical shaking for one or two minutes resulted in the period of dormancy of Erstling and Vera being reduced with the result that two crops were obtained in one year. A number of changes in the morphology of the tubers and foliage were observed in the second tuber generation (cf. *PBA*, Vol. XXIII, Abst. 2779), many of the plants of which proved to be bolters. The occurrence of bolters is attributed to photoperiodic effects and is not thought to be due to somatic mutations. The value of this method of reducing dormancy in breeding is discussed.

2161 Spasojević, V.
(**Structural hybridity as a factor in degeneration and yield reduction of potatoes**).
Zborn. Rad. Inst. Fiziol. Razbić. Genet. Selekc. (Rec. Trav. Inst. Physiol. Développ. Génét. Sélect.)/Rev. Wk. Inst. Physiol. Develop. Genet. Select., Beograd 1952 : **25** : No. 2 : 23–45. [Serbian].

By colchicine treatment of a Serbian clone, a plant was obtained which, though not differing in chromosome number from its progenitor, was more vigorous and higher yielding. In the original clone, meiosis was irregular and fertility reduced; in the colchicine-treated plant, meiosis was regular. It is concluded that the original clone had degenerated and become a structural hybrid; the colchicine treatment apparently restored vigour and eliminated the structural hybridity.

2162 King, J. R.
Pollen and pollination studies on Irish potatoes.
Amer. Potato J. 1955 : **32** : 7–14.

This account of a pollination technique which has been successfully used in breeding potatoes includes detailed information on convenient methods of collecting the flowers and securing, drying, storing and applying the pollen and checking its viability.

2163 Fernholm, H.
Om val av potatissort. (**On choosing a potato variety**).
Svensk JordbrForsk. Årsb. 1954 : 76–84.

This discussion deals with the relative importance of yield and quality in the choice of potato varieties for fodder purposes and for factory use. The emphasis on the different components of quality, e.g. tuber size, colour and shape, dry matter content, flavour and starch content will vary according to the grower's aim. In some critical observations about the list of officially approved varieties of potatoes (cf. Abst. 371), recommendations for Swedish growers are accompanied by notes on the regional adaptation and the disease and drought resistance of varieties, including Jätte Bintje [Giant Bintje] and the new industrial variety Dianella.

2164 Sistrunk, W. A., Webb, R. E. & Miller, J. C.
Suitability of southern grown potato varieties for processing.
Amer. Potato J. 1954 : **31** : 360–65.

All the sixteen varieties investigated were found to be suitable for canning, Cherokee being the best. Kennebec, Cherokee and Pungo gave crisps of high quality.

2165 Hawkes, J. G.
New *Solanum* species in sub-section *Hyperbasarthrum* Bitt.
Ann. Mag. nat. Hist. 1954 : Ser. 12 : **7** : 689–710.

Descriptions are given of the following new species: *S. moscopanum* ($2n = 72$) in series *Conicibaccata*; *S. tuquerrense* ($2n = 48$) in the new series *Piurana*; *S. yungasense* ($2n = 24$) in series *Commersoniana*; *S. sanctae-rosae* ($2n = 24$) in series *Megistacroloba*; and *S. sandemanii* in series *Tuberosa*. Notes are given on the fertility, disease resistance and affinities of these species. The new series *Circaeifolium* comprising *S. circaeifolium*, the type species, and *S. capsicibaccatum*, is also distinguished. In addition, notes are given on *S. brachycarpum*, *S. guerreroense* and *S. verrucosum* var. *spectabilis*, previously described by Correll and placed by him in series *Conicibaccata*, but here assigned to series *Demissa*. *S. verrucosum* var. *spectabilis* is designated *S. spectabile*.

2166 Rudenko, A. I.
(**New potato varieties**).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 12 : 29–31. [Russian].

Descriptions are given of several late varieties recently bred at Karaganda, Kazahstan. They include Dolinskiĭ, which produces large red tubers, and the scab resistant variety 580. Rekord (Epicure x *Solanum andigenum*) is also a late variety. It produces white tubers with shallow eyes, outyields Lorh and is resistant to black leg. Karaganda 958, from Epicure x (Centifolia x *S. andigenum*), matures early, is disease resistant and gives good yields.

2167 Thijn, G. A.
Aardappelrassen met "wild bloed." (**Potato varieties with "wild blood"**).
Meded. Ned. Alg. Keuringsdienst Landbouwzaden Aardappelpootgoed 1955 : **11** : 84–85.

The value of wild species of *Solanum* in crosses with cultivated potato varieties to obtain new types resistant to various diseases is discussed in general terms.

2168 Pohjakallio, O.
Eräitä lisäselvityksiä vuoden 1953 perunarutto- [*Phytophthora infestans* (Mont.) de Bary] epidemian luonteesta. (**Some further elucidation of the nature of the epidemic of potato blight [*Ph. infestans* (Mont.) de Bary] in the year 1953**).
Maataloust. Aikakausk. 1954 : **26** : 142–47.

Experiments are described in which the effects of inoculation of various potato varieties with different strains of *Ph. infestans* were studied. Data are given from field experiments with native Finnish and foreign potato varieties, showing incidence of blight on haulms and tubers, also the results of infecting the variety Rosafolia with several blight strains from various localities. Experiments in 1953 revealed the existence of a strain from Jokioinen which attacked Aquila and 565 (*Solanum tuberosum* x *S. demissum*), hitherto regarded as resistant to blight. This loss in resistance may have been connected with the exceptionally high rainfall at Jokioinen during July and August that year.

2169 Castronovo, A.
Studies on the inheritance of resistance to *Phytophthora infestans* in potatoes.
Amer. Potato J. 1954 : **31** : 397–403.

Five selections, resulting from complex crosses involving *Solanum tuberosum*, *S. demissum* and, in some cases, other wild species, were studied with respect to the inheritance of their reaction to the Argentine isolate 167 of *Ph. infestans* at the Instituto de Fitotecnia, Castelar, Argentina. All the lines included several back crosses to *S. tuberosum* in their pedigrees and had been selected as late-blight-resistant. When selfed, the parent clones gave rise to progenies consisting of resistant, semiresistant and susceptible plants in constant proportions, irrespective of the parental reaction to strain 167. The response of plants in the progenies ranged from hypersensitivity to a high degree of susceptibility. It is suggested that the parental clones contained (1) a single recessive or partially dominant gene, responsible for the hypersensitive response, and (2) multiple genes for resistance or modifiers. No association of resistance with the yield, number, colour and size of the tubers was detected. Strain 167 could not be fitted into any of the proposed classifications or into the international nomenclature of races proposed by Black *et al.* (cf. *PBA*, Vol. XXIV, Abst. 2168).

2170 Segura, C. Bazán de
Trabajos preliminares para la obtención de variedades resistentes al "hielo," *Phythophthora infestans* 1950–1951. (**Preliminary work on producing varieties resistant to *Ph. infestans* blight in 1950-51**).
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1953 : **2** : No. 2 : 8–10.

All forms of *Solanum tuberosum* subsp. *andigenum* and its hybrids were susceptible in artificial inoculations carried out in Peru; some of the hybrids of *S. antipoviczii* obtained from the Commonwealth Potato Collection, Cambridge, England, proved resistant to races A, C and D of the fungus. The species *S. chacoense*, *S. gibberulosum*, *S. fendleri*, *S. ochranthum* and *S. polyadenium* proved susceptible, while some forms of *S. demissum* were resistant to races C and D; others were resistant to D and not to C.

2171 TOMIYAMA, K.
(Cytological studies on resistance to potato blight. I. Changes in the epidermal cells of the midrib of the potato brought about by the first stage of invasion by the blight fungus).
Hokkaido Nogyo Shikenjo Iho/Res. Bull. Hokkaido agric. Exp. Sta. 1954 : No. 67 : 28–38. [Japanese].

A histological study of hyphal penetration of *Phytophthora infestans* into the susceptible varieties Irish Cobbler and Norin 1 [Ministry of Agriculture and Forests 1] and the resistant *Solanum tuberosum* x *S. demissum* hybrids 41089–8 and Kennebec is presented. In the case of the first three varieties, penetration is followed by the shrinking and death of the nucleus and subsequent cellular discoloration. In the case of Kennebec, two thirds of the cells behaved as above while in the rest, degenerative changes appeared to be arrested; the two types of cell showed a mosaic distribution.

2172 YLIMÄKI, A.
Akvila-peruna — merkittävä taudinkestävyysjalostuksen saavutus. **(The potato Aquila, an important achievement in breeding for disease resistance).**
Koetoim. ja Käytäntö 1954 : p. 7.

Aquila is compared with other standard varieties, particularly with regard to the superior resistance of its foliage and tubers to late blight. On account of its lateness it is suitable for cultivation in southern Finland only, but here could be of great value as a culinary or fodder potato.

2173 YLIMÄKI, A.
Perunarutto — pitkä kanto perunanviljelyssämme. **(Potato blight, a problem of long standing in our potato cultivation).**
Maatalous 1954 : **47** : 251–53.

In a discussion dealing chiefly with the control of potato blight in Finland by spraying, a list is given of several potato varieties classified according to their maturation period and showing the resistance to blight of the tubers and haulms. Resistance is greater in the later varieties.

2174 ZOGG, H., GRAF, A. & KELLER, E. R.
Die Bekämpfung der Krautfäule der Kartoffeln und des Kartoffelkäfers. **(Combating late blight of potato and the Colorado beetle).**
Flugbl. Landw. VersAnst. Zürich-Oerlikon 1953 : No. K/1 : 89–92.

Methods of combating late blight and the Colorado beetle by chemical means are outlined and varietal differences in degree of susceptibility to late blight are noted. In recent trials at the Federal Research Station, Zürich-Oerlikon, Switzerland, Jakobi and Robusta proved comparatively resistant.

2175 KELLER, E. R.
Phytophthora-Knollenfäule oder Braunfäule der Kartoffeln. **(*Phytophthora* late blight of potatoes).**
Flugbl. Landw. VersAnst. Zürich-Oerlikon 1954 : No. K/5 : Pp. 4.

An account of the disease and of its symptoms is presented. Trials at the Federal Research Station, Zürich-Oerlikon, have indicated that Robusta is the most resistant of the common varieties cultivated in Switzerland.

2176 TAKASE, N.
(Studies on the resistance of potatoes to late blight. I. On the reaction of potato varieties to late blight).
Hokkaido Nogyo Shikenjo Iho/Res. Bull. Hokkaido agric. Exp. Sta. 1954 : No. 67 : 39–47. [Japanese].

Fifty Japanese and introduced varieties, including 5 forms with *Solanum demissum* in their ancestry, were tested for their leaf and tuber resistance to late blight and for their reaction in the field. Correlation coefficients of + 0·70, + 0·65 and + 0·47 were obtained between size of leaf lesion following artificial inoculation and degree of infection in the field on 23 July, 28 July and 13 August, respectively. Late varieties tended to be more resistant than early. Five varieties, the *S. demissum* hybrids Kennebec, 41089–8, 42044–15 and 4702–7, and the seedling 529–1, were highly resistant in both of these tests; they were also resistant when the tubers were inoculated.

2177 QUEVEDO DÍAZ, A.
Algunos progresos fitotécnicos en el mejoramiento de la papa. **(Some advances in potato improvement obtained by breeding).**
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1953 : **3** : No. 3 : 20–25.

In 1949 a hybrid was made between *Solanum* *antipoviczii* x Seedling 07–4–47 (Apurímac x Huancavelica); several lines of this hybrid, referred to as Cruce 43 [Cross 43], proved immune when inoculated with three races of *Phytophthora infestans* corresponding to Black's D, A and C. The resistant lines were backcrossed to a number of good varieties of *S. tuberosum* subsp. *tuberosum* and a number of fruits were obtained, though it is suspected that many of them were parthenocarpic; those from pollination with Seedling 07–4–47 however contained an average of 95 seeds per fruit and 2469 seeds in all were obtained. The seedlings from them are to be tested for blight resistance. Seeds have also been produced from interpollinations between different lines of Cross 43.

2178 Keay, M. A.
Methods for studying the susceptibility of potato foliage to *Phytophthora* infestans.
Plant Path. 1954 : **3** : 131–32.

The methods devised for testing foliage reaction to *Ph. infestans* at the Potato Genetics Station, Cambridge, are described, information being given on the source of inoculum, inoculation of seedlings and larger plants, humidity chambers and the detached leaflet method. The last-mentioned method is particularly useful in assessing the reactions of first-year seedlings to several strains of the fungus for the purposes of genetical studies and breeding.

2179 Toxopeus, H. J.
Leaf testing as a method of genetical analysis of immunity from *Phytophthora* infestans in potatoes.
Euphytica, Wageningen 1954 : **3** : 233–40.

The presence of genes belonging to the series *R* for resistance to races of *Ph. infestans* can be detected by spraying detached leaflets with swarm-spore suspensions of the pathogen. The author gives a detailed account of the equipment required, arrangement of the tests, production of the suspensions and purification of the *Phytophthora* strains.

2180 Kaiser, W. & Klingler, H.
Untersuchungen über die Feldresistenz einiger Kartoffelsorten gegen *Phytophthora infestans* (Mont.) de Bary. [**Investigations on the field resistance of some potato varieties to *Ph. infestans* (Mont.) de Bary**].
NachrBl. dtsch. PflSchDienst., Berl. 1955 : **7** : p. 21.

Experiments at the Institute of Botany of Darmstadt University and at the Bureau of Plant Protection, Frankfurt, showed a positive correlation between solanin content and field resistance to *Ph. infestans*. The solanin content of the field-resistant variety Carmen was more than double that of the susceptible variety Sabina; in both varieties the amount of solanin present decreased towards the end of the vegetative cycle of the plant.

2181 Ferris, V. R.
Histological study of suscept-pathogen relationships between *Solanum demissum* Lindl. derivatives and *Phytophthora infestans* (Mont.) deBary.
Diss. Abstr. 1954 : **14** : Publ. No. 9746 : p. 1899.

Investigations were carried out on varieties derived from *S. tuberosum* x *S. demissum* crosses, several races of *Ph. infestans* being used. In most of the plants giving a resistant reaction, a necrotic response developed sooner than such a response in susceptible individuals, varietal differences being noted in the rapidity with which this reaction was expressed. The necrotic lesions in resistant and susceptible plants often had a similar appearance 42–49 hours after inoculation, but no ramification of the mycelium could be observed in resistant plants and the lesions remained confined to the small area formed within the first 26–28 hours. When two varieties believed to be duplex for a gene governing resistance were inoculated with races pathogenic to plants simplex for the same gene, a susceptible reaction was obtained. The duplex form also gave a susceptible response when a culture reisolated after serial passages through a plant of this genotype was used as inoculum.

2182 Zadina, J.
Požadavky na brambory a cesty k jejich splnění. (**The properties required of potatoes and methods of attaining them**).
Za socialist. Zeměd. 1955 : **5** : 83–94.

The results of breeding for resistance to diseases in Czechoslavakia are reported. A new variety, Ambra, that combines wart-resistance with earliness has been developed. It will supersede such varieties as Erstling and Bintje. A series of varieties with resistance to Phytophthora derived from *Solanum demissum* have been obtained. Several of these are listed. Many crosses between resistant and susceptible forms have been effected and have given nearly 50% resistant hybrids. Resistance was transmitted to the succeeding generations, although the percentages of resistant segregates varied appreciably. For instance, hybrids involving Monika as the resistant parent gave 24% resistant segregates and Kameraz III 67%. The Czechoslovakian varieties Kardinal [Cardinal] and Kotnov were among the forms resistant to scab and *Spongospora*. Varietal differences in tolerance of viruses have been studied. The yield of Krasava decreased only by 5·9% when this variety was infected with virus X as against Bintje which showed a decrease of 29·8%.

2183 SIXTA, J.
Nové odrůdy bramborů. (**New potato varieties**).
Za socialist. Zeměd. 1955 : **5** : 326–36.

Many recent accessions to the Czechoslovakian list of certified varieties are described. Ambra, from Erstling x Reneta [Reinette], and Mirka [Measure] are early table varieties showing resistance to diseases, notably wart. They produce medium-large kidney-shaped tubers with shallow eyes and their flavour is good. Ambra is lifted 3–5 days after Erstling but its yield is appreciably higher. Mirka outyields Krasava by a good margin. Rapid, from Frühmölle x Hybrid 3b, is a midseason variety grown for fodder or industrial use. It is distinguished by good starch content and a high tuber yield.

2184 BESPALYĬ, I. D.
(**Dual grafting as a method of breeding potatoes**).
Agrobiologija (Agrobiology) 1954 : No. **6** : 118-20. [Russian].

At Eljnja, vegetative hybridization resulted in some new forms resistant to wart and *Phytophthora* and others with a high content of starch. The method employed consisted of grafting a scion possessing the desired character, e.g. the wart resistance of Ostbote [Eastern Messenger], on to another variety. In some cases the effect of the scion upon the stock was intensified by repeating the operation with the first tuber generation of the vegetative hybrid.

2185 ELLENBY, C.
Tuber forming species and varieties of the genus *Solanum* tested for resistance to the potato root eelworm *Heterodera rostochiensis* Wollenweber.
Euphytica, Wageningen 1954 : **3** : 195–202.

A complete list is given of the material tested for reaction to eelworm since 1941, and obtained from the Commonwealth Potato Collection. The few resistant forms found have already been noted (cf. *PBA*, Vol. XIX, Abst. 367 and Vol. XXIII, Abst. 2799).

2186 KÖHLER, E.
Ein unbekanntes Kartoffelvirus. (**An unknown potato virus**).
NachrBl. dtsch. PflSchDienst., Berl. 1955 : **7** : 22–23.

The virus isolated in the Rhineland in 1953 from a pedigree potato breeding line (cf. *PBA*, Vol. XXIII, Abst. 1769) has been shown to be a variant of the new virus, since designated virus S, discovered in the Netherlands in 1952 (cf. *PBA*, Vol. XXIII, Abst. 1770). The German variant differs from the Netherlands strain in its ability to produce symptoms on *Gomphrena globosa*. *Solanum demissum* proved highly susceptible to the new virus, displaying severe leaf necrosis, followed by mosaic, three weeks after infection.

2187 BAERECKE, M.-L.
Versuche zur Isolierung von Stämmen des Blattrollvirus. (**Experiments on isolating strains of the leaf roll virus**).
Züchter 1955 : **25** : 67–79.

Using *Physalis floridana* as an indicator, 92 leaf roll isolates obtained from different potato-growing areas of Western Germany were studied under greenhouse conditions and in the field at the Erwin Baur Institute, Voldagsen, Germany. Three degrees of infection were distinguished and 14 putative strains isolated from the varieties Bona and Mittelfrühe [Medium-early]. Differential reactions were observed in 11 potato varieties infected with isolates from Bona and Mittelfrühe; no variety was immune to all 14 strains of the virus but most proved resistant to at least two or three strains.

2188 **Scottish Plant Breeding Station, Craigs House, Corstorphine, Edinburgh.**
Trans. Highl. agric. Soc. Scot. 1953 : **65** : 96–98.

The use of a range of potato hosts differentiated by the presence or absence of two genes with independent control of hypersensitivity has made possible the recognition of four distinct groups of virus X strains. Group 1 produces a hypersensitive reaction in hosts carrying either or both genes; groups 2 and 3 each cause hypersensitive reactions in the presence of one gene but not the other; and group 4, comprising a single strain, is strongly pathogenic though only weakly aggressive on hosts carrying both genes simultaneously.

Data have been obtained which support the hypothesis that the immunity of US seedling 41956 to the known strains of virus X is determined by two dominant genes which together nullify the effect of the hypersensitivity genes but separately allow the latter to produce their full necrotic effects in the presence of appropriate virus strains. Immunity to some strains has also been found in several clones of *Solanum acaule*.

Necrotic responses to virus Y appear to be controlled by similar or identical genes in *S. demissum*, *S. simplicifolium*, and cultivated varieties. The same material has provided evidence of linkage between the factors controlling necrotic reactions to viruses A, C, X and Y.

2189 AKELEY, R. V., *ET AL*
Saco: a new late-maturing variety of potato, immune from common race of the late blight fungus, highly resistant to if not immune from net necrosis, and immune from mild and latent mosaics.
Amer. Potato J. 1955 : **32** : 41–48.

The newly released late variety Saco is equal to Green Mountain in yield and dry matter content and, as mentioned above, shows multiple disease resistance. It was developed by the United States Department of Agriculture from the cross USDA Seedling X95–56 x USDA Seedling 41956, the former parent originating from Earlaine x USDA Seedling 3895–13 and the latter from a cross involving USDA Seedling 24642 (Sutton's Flourball x Aristook Wonder) and USDA Seedling 959–1 (Villaroela selfed).

2190 CORBETT, M. K.
Hypersensitivity of *Solanum tuberosum* L. hybrids to potato virus Y (*Marmor upsilon* Holmes).
Diss. Abstr. 1954 : **14** : Publ. No. 9743 : p. 1873.

Clones were mechanically inoculated in the greenhouse with four strains of virus Y. Clones giving no reaction or producing local lesions without systemic infection were planted in exposure plots in the field; under these conditions they developed systemic infection. Various experiments indicated that the localization of the virus in the apparently hypersensitive clones was the combined result of (1) the slow spread of the virus from the site of mechanical inoculation of older leaves and (2) abscission of the inoculated leaves.

2191 RICHHARIA, R. H. & GHOSH, A. N.
Investigations on the breeding of the sweet potato, *Ipomoea batatas*, Lamk.
Indian J. Hort. 1954 : **11** : 33–48.

In experiments at the Agricultural College, Sabour, Bihar, crosses between varieties from the Indian Agricultural Research Institute, New Delhi, and between American varieties and local types gave very poor results, only ten hybrid seeds being obtained by crossing a total of 185 flowers. From these seeds, only four adult plants were raised, representing the cross L1 x Ranger. Plants from open-pollinated seed of some of the varieties and from L1 x Ranger showed segregation for cordate *vs* palmate leaf and other characters but the populations were too small for a study of inheritance.

2192 LAM, S., & CORDNER, H. B.
Flowering hormone in relation to blooming in sweet potatoes.
Science 1955 : **121** : 140–41.

A technique of cleft grafting is described which has induced flowering in the Jersey type of sweet potato and which should be useful in breeding. Only two species, *Ipomoea tricolor* and *I. hederacea* were effective as stocks in inducing flowering. Experiments with *I. tricolor* suggested that a flowering hormone originating in the leaves of this stock was translocated to the meristem of the scion.

2193 DE LA HUERTA, A. & NAVARRO, E.
Variedades de batatas. (**Varieties of sweet potato**).
Inst. nac. Invest. agron., Madrid 1954 : unpaginated.

In the newly irrigated zones of southern Spain the sweet potato is being grown more extensively for industrial use as well as for human consumption. With this object in mind a study has been made of 26 varieties, some of them newly introduced, others being old Spanish varieties. Descriptions and illustrations are presented, the data given including habit, yield and content of dry matter, starch and sugars.

FIBRES

2194 KELKAR, S. G. & KAIWAR, S. R.
Laxmi cotton from Karnatak.
Indian Cott. Gr. Rev. 1954 : **8** : 263–74.

The variety Laxmi (cf. *PBA*, Vol. XXII, Abst. 1270) is earlier than Gadag 1 and superior in yield, resistance to red leaf blight, ginning percentage, staple length and spinning performance.

2195 SAHASRABUDHE, V. B. & SIMLOTE, K. M. **A note on the performance of Malwi 9 in Malwa.**
Indian Cott. Gr. Rev. 1954 : 8 : 275–79.

The yield of Malwi 9 was about equal to that of M9–20 and, except on wilt-infected land, was equal to that of Dhar 43 (Bhoj) and superior to that of Jarila.

2196 GORJANSKIĬ, M.
(Advantages of the method of cultivating cotton in squares in the Ukraine).
Hlopkovodstvo (Cott.-raising) 1955 : No. 3 : 29–32. [Russian].

Agronomic methods are discussed, and 3982, a new variety recently developed in the Ukraine, is described briefly. It matures 3–5 days earlier than 611–b, has a ginning extraction of 40% and produces glabrous seeds.

2197 **Thirty-second Annual Report of the Indian Central Cotton Committee 1953** : Pp. 116.

Genetics

Investigations on the *li* series of genes for lintlessness in Asiatic cottons continued. F_2 data indicated homology between the mutant gene li_{sp}, determining sparse lint of the Cocanadas type, and li_d. The following gene order was established: $L^N - li_d - Lc_1{}^K$. The factor li_e is inherited independently of R_3 for gold colour of the petals. The inheritance of fuzz colour and the effect of the major genes involved upon lint characters are being analysed.

(*Gossypium arboreum* x *G. thurberi*) doubled x *G. hirsutum* and its back cross were selected for halo length (23–33 mm.), ginning outturn (23–35%) and yield. Some selections from back crosses of Asiatic x *G. hirsutum* hybrids with *G. hirsutum*, superior to Indore 2 in ginning percentage and other characters, were chosen for further testing. Selections combining jassid resistance, due to hairiness, and desirable commercial properties were secured from the back cross of *G. hirsutum* x *G. tomentosum* to Indore 2. Plants with a halo length of 29·2–40·0 mm. and ginning outturn of 21·6–34·7% were selected from first back crosses of *G. bardadense* (Sea Island V135, Early Pima or Sakel) x *G. hirsutum* 'Indore 2' to Indore 2.

Bombay

In work on cotton for the Khandesh tract, strains Y–1 and W81 from a cross between the wilt-resistant type Dokras 2–9–8–3 and Px–2–28 maintained their superiority over Virnar in yield and spinning performance (cf. *PBA*, Vol. XXIV, Abst. 1249).

The wilt-resistant strain 2087 has been named Vijalpa and distributed for cultivation in the Surat tract (cf. *PBA*, Vol. XXIV, Abst. 1270).

A few hybrid selections superior in yield to the Wagad cotton Kalyan were isolated.

In view of the susceptibility of Laxmi to wilt and its lateness for the Dharwar-American tract, tests are being carried out on hybrid selections developed at Gadag and elsewhere, to find a suitable substitute for this variety.

Progress is reported in the production of F_1 intraspecific and interspecific hybrids under the scheme on perennial cottons at Dharwar.

Punjab

In work on cotton for the south-eastern districts, local strains have been crossed with Jarila, Malvi, Gaorani, H420, Dokras and other varieties, with a view to developing selections superior in lint length to 231 Rosea. The American type 216F has shown not only superiority in yield over the standard desi but also drought resistance. Reselection 216F/14 surpassed 216F in all economic characters and matured a fortnight earlier (cf. Abst. 399). Valuable derivatives were obtained from crosses of Punjab-American with long-stapled introduced varieties, effected to develop long-linted American types combining earliness, resistance to jassid and drought, high yield and improved ginning outturn.

In breeding long-stapled American strains at Abohar, LL29 has been developed, possessing a ginning outturn of 34·3% and lint length of 1·02 ins. Crosses of Punjab-American cottons with South Rhodesian and other long-linted types have yielded promising selections.

The improved American strain 320F has been released for the submontane district.

Madras

The Madhya Pradesh variety H420 is being distributed instead of Raya Laseema 1 (881F), originally proposed as a substitute for the short-stapled Mungari type.

Progress is reported in the development of wilt-resistant selections of the Westerns type.

In work on Cambodia cotton in the ceded districts, selections showing improvement in fibre properties have been produced; types resistant to jassid or blackarm have also been isolated.

New strains developed for the Karunganni region exhibited improvement in staple length and ginning outturn (cf. Abst. 389).

A number of selections were superior in quality to MU1 in tests carried out under the scheme for breeding *G. hirsutum* strains for growing as a winter crop in the central region. In addition, interspecific hybrids and reselections of multiple crosses were further selected.

In work on the development of long-staple cottons for the coastal parts of the south Arcot district, Madras Uganda 2, 0511–F4, 9030 and 0484–A1 again showed promise compared with Madras Uganda 1.

Some selections developed under the scheme of breeding Cambodia cotton for nonirrigated tracts in the central and southern region of the state surpassed MU1 and MU2 in various characters.

Madhya Pradesh

New strains of local and American cottons gave good results in the different tracts.

Uttar Pradesh

A scheme was initiated with the following objects: (1) to find a long-staple variety adapted to growing at high altitudes, (2) to explore the possibility of cultivating a ratoon crop of Sea Island and (3) to develop early maturing annual and perennial varieties for the hill districts.

Assam

In the scheme for producing high yielding types of coarse short-staple cotton with high ginning outturn, progenies of Garo Hill and Naga Hill were among the material selected. Survey and collection of cottons cultivated in the state continued.

Hyderabad

Selection II–45–2204 of Gaorani 12, the best of the new strains tested in the Parbhani district, is to be multiplied for distribution.

Pepsu

Testing of American types was initiated.

Mysore

The Mysore-American variety MA5 again maintained its superiority, combining good yielding ability, long staple and high ginning percentage.

Rajasthan

Progress is reported in the development of a strain of American cotton capable of spinning 24's and suitable for Mewar.

Madhya Bharat

Work on breeding varieties for Malwa continued at the Institute of Plant Industry, Indore. The new hybrid strain Indore 4 surpassed MU4 in ginning percentage and lint yield. Selections superior to the control Indore 2 in staple length (1·12–1·21 in.), ginning outturn (31·3–42%) and yield were obtained from interspecific hybrid material.

In the scheme on Nimar cotton, D46–5 and D48–154 have proved to be outstanding with respect to yield and ginning percentage and also equal to Jarila in fibre properties; named Nimar 1 and Nimar 2, respectively, they are to be multiplied for distribution (cf. Abst. 388).

2198 KNIGHT, R. L.
Cotton breeding in the Sudan. Part III. American Upland cotton.
Emp. J. exp. Agric. 1954 : **22** : 176–84.

The author gives a succinct account of breeding for blackarm resistance and other characters such as high ginning outturn, earliness as a means of pest avoidance and suitability for mechanical harvesting in Upland types (cf. Abst. 391). A short outline of the general methods employed in cotton breeding in the Sudan is also provided.

2199 CALZADA BENZA, J.
Selecciones de algodón para los valles de la Costa Central. (**Cotton selections for the valleys of the Central Coastal belt**).
Agronomía, Lima **19** : No. 77 : 29–43.

On the basis of tests carried out in a number of valleys in Peru, the results of which are presented, indications are given of the selections that have given the best results in each valley. Selection Cñ550–48 proved to have the widest range of adaptability and the best combination of lint length and ginning percentage; it is also resistant to aphis attack but susceptible to wilt and nematode. LM708–44 is earlier and also has good lint but it too is susceptible to wilt. These two varieties have yielded 50·9 and 50·3 q. of ginned cotton per fanegada* as compared with 48·1 q. from LM7–35, the variety previously grown.

The best selections as regards resistance to wilt (*Verticillium albo-atrum*) were LMW12–40 and LMW395–42.

2200 KRATIROV, O.
(**Selection based upon vernalization as a method for improving earliness in cotton**).
Hlopkovodstvo (Cott.-raising) 1955 : No. 2 : 19–23. [Russian].

The earliness and yield of S460 were improved at Taškent by first vernalizing the seed for 3 days at 17–18° C. and then for 5–7 days at 10° C., relative humidity being maintained at 70% and

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* 1 fanegada = approx. 1·59 acres.

80–90%, respectively. The plants grown from these seeds were then selected for early maturity at various stages of development, the new forms obtained having shorter internodes than the parent variety. Similar results were also obtained in certain unspecified hybrids by the use of this method.

2201 HANAZAROV, D.
(**Achievements in promoting the cultivation of cotton in Kara-Kalpakia**).
Hlopkovodstvo (Cott.-raising) 1955 : No. 3 : 9–16. [Russian].

The new varieties KK 1083 and 1543, both of which were bred at the Kara-Kalpak Cotton Research Station, are equal to 108F in yield and fibre quality and mature 10–15 days earlier.

2202 MENZEL, M. Y. & BROWN, M. S.
Isolating mechanisms in hybrids of *Gossypium gossypioides*.
Amer. J. Bot. 1955 : **42** : 49–57.

The F_1 of *G. thurberi* x *G. gossypioides* dies in the cotyledon stage; the F_1 of *G. raimondii* x *G. gossypioides* survives and is fairly regular in chromosome pairing but is sterile; the F_1 of *G. thurberi-raimondii* x *G. gossypioides* is partly fertile (cf. *PBA*, Vol. XXII, Abst. 2064 and Abst. 2839). Crossing *G. barbadense* [doubled haploid (Z157)] x *G. gossypioides* resulted in heterotic hybrids showing a considerable amount of asynapsis; observations so far suggest that the short-day habit of *G. gossypioides* is dominant to the day-neutral behaviour of *G. barbadense*. These hybrids produced some viable gametes, as shown by crosses with *G. hirsutum* and *G. barbadense*, although only two good seeds were obtained. The F_1 of *G. hirsutum* x *G. gossypioides* produced a few buds before lethal stem-necrosis set in, was day-neutral and displayed good pairing of the chromosomes. The incompatibility of *G. thurberi* x *G. gossypioides* and sterility of *G. raimondii* x *G. gossypioides* are regarded as genic. The pairing behaviour of F_1 and F_2 hybrids and back crosses from a cross between a trisomic of *G. hirsutum* derived from an asynaptic stock and *G. barbadense* (Z157), and the pairing behaviour of *G. barbadense* x *G. gossypioides* and *G. hirsutum* x *G. gossypioides*, are explained according to the hypothesis that reduction in pairing depends upon two recessive loci, a_1 in genome D and a_2 in A. It is postulated that genome D_6 of *G. gossypioides* carries a_1, the F_1 hybrids with *G. hirsutum* and *G. barbadense* having the genotypes $a_1a_1A_2$ and $A_1a_1a_2$ respectively. The high degree of asynapsis in *G. barbadense* x *G. gossypioides* is attributed to a shift of the expression of a_1 towards dominance, by modifiers. Disparity in photoperiodic behaviour is regarded as a fourth genic mechanism capable of isolating species, in addition to hybrid incompatibility, sterility and asynapsis.

2203 LYSIKOV, V. N.
(**The development of new forms of cotton by cultivation in a new environment**).
Agrobiologija (Agrobiology) 1954 : No. 6 : 46–50. [Russian].

The inheritance of the central Asiatic variety S8517 was shattered by being grown in Moldavia for one year. The new forms were in some cases more productive than S8517 and displayed considerable variation in yield, plant height, boll size and thickness of the branches.

2204 MÉNDEZ R., E. D.
Creación de variedades precoces de algodón para la Costa Central. (**Production of early varieties of cotton for the Central Coastal Belt**).
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1952 : **2** : Nos. 3–4 : 4–6.

By selection from Tangüis the author has produced a cotton, referred to as LM1041–49, which matures at the end of 8 months, has a pull of $1\frac{3}{16}$ in. to $1\frac{1}{4}$ in., yields well and is resistant to wilt. A number of crosses have also been made. From Tangüis LMW467–45 x Karnak, two selections equal to Tangüis in yield and to Karnak in lint quality have been obtained; from Tangüis LMW467–45 x Pima several lines maturing in $7\frac{1}{2}$–8 months have been selected, their lint being similar to that of Tangüis in quality; from Tangüis LMW467–45 x U4, two lines without vegetative branches have been produced; they yield 80% of their crop within 6 months and produce more lint than Tangüis; seed of these selections is to be distributed to farmers in the Central Coastal Belt of Peru.

2205 MCGREGOR, S. E., RHYNE, C., WORLEY, S. (JUN.) & Todd, F. E.
The role of honey bees in cotton pollination.
Agron. J. 1955 : **47** : 23–25.

An experiment was carried out at Tucson, Ariz., to determine the effect of honey bees on total yield and on natural hybridization. In cages and open plots containing (1) the

Gossypium hirsutum varieties A–44, Red Acala, Virescent Yellow Okra Leaf and Kime Yellow, (2) *G. hirsutum* 'Red Acala' and *G. barbadense* 'Pima S–1' or (3) *G. barbadense* 'Pima S–1' and 'Red,' honey bees were responsible for various amounts of cross pollination. Only Pima S–1 and A–44 were harvested for yield data. In cages with bees, Pima S–1 produced 24·5% more seed cotton than in cages without bees. A–44 showed no increase in total yield but set an earlier crop when grown in cages with bees.

2206 TER-AVANESJAN, D. V. & LALAEV, G. B.
(Intravarietal hybridization between cotton plants sown at different dates).
Agrobiologija (Agrobiology) 1954 : No. 6 : 57–61. [Russian].

In Armenia, the yield, earliness, 1000-seed weight and resistance to *Verticillium* of the F_1 and F_2 of varieties such as 108F and 1298 were improved by intravarietal pollination between biologically different plants obtained by sowing at different dates. Data on the performance of forms of 108F improved by this method are given.

2207 ADŽABJAN, A. & LALAEV, G.
(Effectiveness of using flowers at various ages for intravarietal crosses of cotton).
Hlopkovodstvo (Cott.-raising) 1955 : No. 1 : 37–41. [Russian].

In Armenia, the earliness and yield of raw cotton of such varieties as 108F, 18819 and 1298 were improved by sowing the seed for several generations in mid-March instead of April. Recently this breeding method has been modified to obtain speedier results. The seed of a variety was sown on different dates and the resulting plants were then cross pollinated as follows: plants sown on 20 April ♀ x 5 April ♂, 10 May ♀ x 20 April ♂, 5 April ♀ x 10 May ♂, and 10 May ♀ x 5 April ♂. Data on the yield, earliness, length of fibre and size of bolls of the first to third generations from plants crossed in this way showed them to be superior to those from uncrossed plants or from intercrossing plants all sown at the same time.

2208 WEAVER, J. B. (JUN.)
Reciprocal grafts between genetically lethal and normal cotton.
J. Elisha Mitchell sci. Soc. 1954 : **70** : p. 128. (Abst.).

The behaviour of reciprocal grafts between *Gossypium hirsutum* 'Coker' and genetically lethal hybrids of *G. arboreum* 'Sanguineum' and *G. hirsutum* indicated that abnormality in mineral nutrition or photosynthesis is not the cause of the death of the lethal hybrids. It was concluded that death occurs in any plant organ carrying the lethal gene combination.

2209 MINKO, D.
(Breeding methods for improving the size of bolls in cotton).
Hlopkovodstvo (Cott.-raising) 1954 : No. 12 : 41–46. [Russian].

At the USSR Institute of Cotton, a number of hybrids were trained upon rich soil and had some vegetative and reproductive portions removed to ensure an increased supply of nutrients to the organs remaining. The progeny of each hybrid were pollinated *inter se* and selections for earliness and large bolls made. Data are presented showing the improvements in yield, earliness and size of bolls obtained in some hybrids by these methods. The material includes the new varieties S9010 and S9011, which produce bolls weighing 8·6–9 g. or 0·7–1 g. more than those of the variety 108F. They outyield 108F by 13–17%, mature 4–12 days earlier and have good technological properties.

2210 NAYAK, H. R.
Studies on the quality and agronomic characters of cottons grown under different manurial treatments.
Indian Cott. Gr. Rev. 1954 : **8** : 280–95.

In a trial at the Dharwar Farm, fibre weight and length of four varieties were independent of manurial treatments. Under all treatments, Jayawant had the shortest and 2.3.41 the longest fibres, while KFT 12.2.5 and Jayadhar were intermediate. The fibre weights of Jayadhar and Jayawant were consistently greater than those of KFT 12.2.5 and 2.3.41.

2211 SVETAŠOV, A.
(Breeding cottons that combine earliness and large bolls).
Hlopkovodstvo (Cott.-raising) 1955 : No. 1 : 29–36. [Russian].

Most of the F_1 plants of crosses between early-maturing varieties originating from Dagestan and late central Asiatic cottons, characterized by large bolls, were early when the hybrid seed was sown considerably earlier than at the normal sowing date. The F_1 plants had large bolls and in some hybrids this character was fixed by single plant selection in the succeeding generations. Data on earliness, weight of bolls, yield, ginning percentage and length of fibre of some new varieties and hybrids so obtained are presented. A hybrid from D153 x S1579 has a growth habit suitable for combine harvesting.

2212 Strogonov, B. P.
(Improving the resistance of cotton to salinity by intravarietal hybridization).
Ž. obšč. Biol. (J. gen. Biol.), Moskva 1954 : **15** : 460–67. [Russian].

In Azerbaĭdžan, cotton yields were improved when direct and reciprocal crosses were made between plants grown on highly saline soil and those from a part of the field where the concentration of salt was low. Data showing an improvement in the raw cotton yields of the varieties 1363 and 2011 when so treated are presented.

2213 L'Institut de Recherches du Coton et des textiles exotiques (I.R.C.T.). [**The Institute of Research on Cotton and exotic textiles** (**IRCT**)].
Emp. Cott. Gr. Rev. 1955 : **32** : 31–36.

The above body was set up in 1946 to coordinate research on fibre plants in France and French territories overseas. In French Equatorial Africa, its achievements include the development of Banda I, II and IV, varieties that outyield Triumph and are superior to it in the quality of their fibre. Selection for higher yield in the wilt-resistant varieties Stoneville and Arkansas is also being carried out. At the Bambari Research Station, breeding for resistance to *Lygus* sp., blackarm and jassid is receiving priority. In the Chad area, characterized by a long dry season, the Tikem and Bebedjia stations have conducted selection work on lines introduced from Zaria, Nigeria. The most promising results were obtained from A49R, A50T, A150, A58–151 and A58–333, all of which produce fibre of good quality, are resistant to jassid and outyield Allen Long Staple, the variety most widely cultivated in the Chad district. In French West Africa, contamination of *Gossypium barbadense* by the semi-wild *G. punctatum* has resulted in the deterioration of the plant material grown. The Anie-Mono and Bouake stations have therefore initiated a comprehensive programme of selection; in addition, breeding for resistance to insect pests is in progress. At the Tadla station, Morocco, selection has improved the yield and technological properties of Pima 67. Selection work on *Urena lobata* and *Hibiscus cannabinus* at the Madingou station in the Central Congo is also reported briefly.

2214 Sizikov, P.
(Breeding work on farms raising cotton élites).
Hlopkovodstvo (Cott.-raising) 1955 : No. **3** : p. 47. [Russian].

At Naryn, Turkmenia, selection within the variety 108F has resulted in improved resistance to lodging and a lower proportion of indehiscent locules. The new form has a compact habit and may be planted more densely.

2215 Méndez R., E. D.
La lucha contra el wilt del algodón Tangüis. (**Control of wilt in Tangüis cotton**).
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1954 : **3** : No. 1 : 8–11.

Tangüis cotton, in the course of the rapid extension of its cultivation in Peru, has lost some of its original resistance to wilt, caused by *Verticillium albo-atrum*, and has been subjected to further selection. Lines LMW395–42, LMW 467–45 and LMW1–52 are all distinguished by resistance combined with high lint yields and are now being tested for their reaction to biotypes A and B of the fungus.

2216 Phadnis, B. A.
Jassid incidence in *arboreum* cottons.
Indian Cott. Gr. Rev. 1954 : **8** : p. 315.

Jassid attack resulting in leaf curl but having no apparent effect on growth or yield has been observed on *Gossypium arboreum* varieties at Amreli. Of the attacked varieties, the narrow-leaved strains V434 and V438 were least affected.

2217 Jahontov, V.
(The problem of breeding cotton varieties resistant to jassids).
Hlopkovodstvo (Cott.-raising) 1955 : No. **3** : 45–46. [Russian].

Investigations on the physiological nature of resistance to jassids in cotton and other plant species revealed a close correlation between osmotic pressure of the sap and degree of resistance. Cotton plants with osmotic pressures of 2·64–6·98 atmospheres proved highly susceptible; at the other end of the scale, plants with pressures of 12·37–18·71 were almost immune. The fertility of jassids raised on highly resistant plants was greatly reduced. The author suggests that attention be paid in future breeding programmes to the possibility of utilizing this type of resistance.

2218 KNIGHT, R. L.
The genetics of jassid resistance in cotton. V. Transference of hairiness from *Gossypium arboreum* to *G. barbadense*.
J. Genet. 1955 : **53** : 150–53.

A major gene for hairiness was transferred from a tetraploid strain of Multani (*G. arboreum*) to Sakel and found to occupy the same locus as the Tangüis gene H_1.

2219 KALAYANARAMAN, S. M.
Recent progress of cotton research in Madras (1950-1953).
Indian Cott. Gr. Rev. 1954 : **8** : 256–62.

Progress in breeding at various stations and the results of variety trials are described (cf. *PBA*, Vol. XXIII, Absts. 1310 and 2818 and Vol. XXIV, Abst. 1249). Data are given on the economic characters of promising varieties.

In trials of irrigated American cotton in Thungabadra, Laxmi and MA2 have proved superior to the local variety in yield, staple and ginning percentage, Laxmi being much better than MA2.

At Coimbatore, staple length and ginning percentage of 5341 have proved superior to those of Karunganni 5.

Variety 4136, a selection made at Hagari, has a higher yield and ginning percentage than Westerns 1. Of several early-maturing *Gossypium arboreum* varieties, 197–3 appears to be the best adapted to the Vizagapatam district.

At the Adoni station three K varieties have continued to give higher yields than 881F.

2220 O'KELLY, J. F., CROCKETT, S. P., HURT, B. C. & FREEMAN, K. C.
Mississippi cotton variety tests 1952.
Bull. Miss. agric. Exp. Sta. 1953 : No. 499 : Pp. 7.

O'Kelly, J. F., CROCKETT, S. P., HURT, B. C. & FREEMAN, K. C.
Mississippi cotton variety tests 1953.
Bull. Miss. agric. Exp. Sta. 1954 : No. 509 : Pp. 8.

Tables are given summarizing the results of trials carried out in different localities in Mississippi during 1952 and 1953.

2221 **Seed bulletin. Fibre flax.**
IVRO, Wageningen 1954 : Pp. 7.

This bulletin is an English version of the information summarized in *PBA*, Vol. XXIV, Abst. 2249.

2222 POLIŠČUK, M.
Naše odrůdy lnu. (**Our flax varieties**).
Za socialist. Zeměd. 1955 : **5** : 363–71.

Descriptions are given of new high-yielding flax, linseed and dual-purpose varieties bred recently at Šumperk-Temenice, Czechoslovakia. Some of the varieties are distinguished by early maturity, others by resistance to drought and lodging.

2223 SCHWINGHAMER, E.
Physiologic specialization and the nature of parasitism in *Colletotrichum linicolum* Pethyb. & Laff.
Diss. Abstr. 1954 : **14** : Publ. No. 10041 : 1896–97.

By means of the flax differentials Punjab, Ottawa 770B, Leona, CI1016, CI1235 and CI1247, 42 monoconidial isolates of *C. linicolum* were separated into five race-groups. Of the commercial varieties tested by inoculation at the seedling stage, only Crystal, Sheyenne, B5128 and Redwing showed some degree of resistance to isolates representing three race-groups, and these varieties and Redwood, Biwing and Minerva were relatively resistant to seed infection. Information is also given on the technique of testing and the histology of the susceptible and resistant reactions.

2224 Vezelvlas, 1955. (**Fibre flax, 1955**).
Landbouwvoorlichting 12 : Bijl. 1; Ber. Rassenkeuze 1955 : No. 180 : unpaginated.

Data on yields of seed and fibre and on the fibre content of the straw are presented for 13 varieties tested on different types of soil in the Netherlands in 1954. Wiera, Formosa, Diana and the new variety Hijlkema 1871 gave the highest yields of straw on all types of soil and Solido and Wiera the highest yields of seed. Solido and Noblesse produced the most fibre per given weight of straw. Hijlkema 1871 is described as a long-strawed, blue-flowered variety possessing good resistance to rust and smut. It matures late, is resistant to lodging and the quality of its fibre is good. Its seed yield, however, is extremely low.

2225 KUWADA, H.
(**On differences in physiological and ecological characters between amphidiploids obtained by breeding and the parent plants. XI. On the artificial germination and storage of pollen**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 59–66. [Japanese].

A comparative study was made of the optimum temperature, humidity and pH for pollen germination, the rate of pollen tube growth and the viability of pollen under optimum storage conditions of *Hibiscus* (*Abelmoschus*) *esculentus*, *H. manihot* and the amphidiploid hybrid between them. In general, the hybrid was intermediate between the parents in respect of the characters studied or resembled one or other of the parents.

2226 Kuwada, H.
(On differences in physiological and ecological characters between amphidiploids obtained by breeding and the parent plants. XII. Seed germination and enzymes).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 67–70. [Japanese].

A study was made of percentage germination and peroxidase content of the seeds of *Hibiscus* (*Abelmoschus*) *esculentus*, *H. manihot* and the amphidiploid hybrid between them after various periods of storage. Percentage germination dropped to zero after five years in *H. esculentus* and the amphidiploid; in *H. manihot* viability was practically nil after four years. The decrease in peroxidase content was not closely associated with decline in germinability; peroxidase content decreased more quickly in the amphidiploid than in the parent species.

2227 Ghosh, T. & George, K. V.
Brown-rot of mesta (*Hibiscus cannabinus* Linn.).
Indian Phytopath. 1953 : **6** : 106–09.

A new fungus disease of *H. cannabinus* in Bengal has been tentatively identified as a species of *Volutella*. All the indigenous varieties tested have proved susceptible, but the strain American Commercial shows some resistance.

2228 Narita, Y. & Yoshinaga, K.
(Studies on the breeding of *Broussonetia kazinoki*. I. On male flowers in the variety Akaso).
Nihon Ringaku Kai Shi/J. Jap. For. Soc. 1954 : **36** : 291–94. [Japanese].

A few male flowers have been detected in the above variety, in which practically all the flowers are female. Using pollen from these male flowers, applied to female flowers of the same variety, 9 berries and 111 seeds have been obtained.

SUGAR AND STARCH PLANTS

2229 Ramírez R., C.
Records de producciones y nuevas variedades de cañas de azúcar. **(Yield records and new varieties of sugar cane).**
Suelo tico 1954 : **7** : 283–86.

Hybrid B43–62 from Barbados proved superior to all others tested in trials in Costa Rica and has given yields of sugar varying from 0·26 to 0·66 metric tons per acre per month.

2230 Story, C. G.
Q.58.
Cane Gr. quart. Bull. 1955 : **18** : 79–81.

Further information is given on the performance of the sugar cane variety Q58, developed from POJ2878 x Co.290 (cf. *PBA*, Vol. XXIII, Abst. 509). The variety is expected partly to replace Q50 in the Mackay district of Queensland.

2231 **(Abridged report of the results of sugar cane variety trials during 1952-53).**
Taiwan Tangyeh Shihyenso Yenchiu Huiyen/Rep. Taiwan Sug. Exp. Sta. 1953 : No. 10 : 7–34. [Chinese].

This report on the agronomic characters, disease resistance, yield and quality of the juice of over 130 varieties under trial in Taiwan follows along the lines of the report for the previous season (cf. *PBA*, Vol. XXIV, Abst. 1314). Most of the varieties were seedlings reared during 1945–48. The following varieties receive special mention: 35–523 (FP189 x F23), a late high-yielding form; 36–1119 (F86 x 1130/16A), a midseason cane with a high sugar content; 37–435 (POJ2878 x Co356), notable for high sugar content and resistance to diseases and lodging; 37–1316 (188/12C x F108), an early vigorous cane; 37–1368 (188/12C x F108), a heavily tillering type; 37–1430 (Co331 x F84), a form giving heavy yields of cane; 37–1483 (F121 x 341/14B), a vigorous variety with thick canes; 38–591 (POJ2878 x Co356), a late variety; 38–1251 (188/12C x F108), a cane producing heavy solid tillers; and 38–1811 (34–257 x PSA31), a variety with high combining ability, suitable as a female parent.

Proceedings of the Twenty-eighth Annual Congress of the South African Sugar Technologists' Association held in Durban 29th March–2nd April, 1954 : Pp. 156.

The following papers of interest to plant breeders were presented at the above congress:—

2232 *Robertson, C. L. Development of the sugar industry in Southern Rhodesia. (pp. 12–25).*

In the course of this review it is noted that, of the varieties under cultivation, CP29/320, Co.281 and NCo310 showed the greatest resistance to the severe frosts of 1953 and that the frost-susceptible variety POJ2878, which has high water requirements, has the highest smut resistance.

In fertilizer trials of six varieties, it was found that increased rates of nitrogen application produced significant increases in yield in CP29/116 and POJ2878 but not in Co. varieties.

2233 *Brett, P. G. C. The first ten years of sugarcane breeding in Natal. (pp. 141–45).*

This article has been summarized from another source in *PBA*, Vol. XXIV, Abst. 3185.

2234 **54th Annual Report of the Bureau of Sugar Experiment Stations, Queensland 1954** : Pp. 93.

The following were among the investigations carried out by the Division of Cane Breeding:—

Both biparental and polycrosses were made, the latter to test the value of a large number of varieties as ♀ parents. Among the parents used were EPC38–304 (POJ2725 x a Burmese strain of *Saccharum spontaneum*), QB53–1 [Badila x 51 NG63 (*S. robustum*)], Co.475, and several varieties of *S. robustum* collected in New Guinea during 1951.

Application of 1% maleic hydrazide solution 10–12 weeks before normal flowering time is considered to be a more satisfactory method of delaying arrowing when necessary in hybridization than light treatment or lopping.

The characteristics of the stem epidermis and of the pubescence of the leaf and stem have proved to be useful as a basis of distinguishing varieties in the New Guinea collection.

Chromosome numbers are being determined. Variants of Badila have been distinguished.

The varietal composition of the commercial crop in 1953 and previous years is analysed. Q50 was the chief cane grown in 1953. Varieties bred in Queensland now constitute three-quarters of the crop.

2235 Cheng, C.-F.
Genetical analysis of morphological characters of the OMM-type hybrid obtained from the POJ2725 x *Miscanthus japonicus* cross.
Taiwan Tangyeh Chikan/Taiwan Sug. Quart. 1955 : **5** : No. 2 : 27–36.

A hybrid with $2n = 96$ chromosomes, designated 36–771 and derived from the above cross, is described. It is believed to have one genome from POJ2725 and two from *M. japonicus*. Tables are given listing the characters of the hybrid that (1) are completely dominant, (2) show a dosage effect, viz. in respect of two *Miscanthus* genomes, rather than one, and (3) are of uncertain inheritance.

2236 Li, H. W., Ma, T. H. & Shang, K. C.
Cytological studies of sugarcane and its relatives. X. Exclusive "patroclinous" type in the F_1 of sugarcane variety and *Miscanthus japonicus* Anders.
Taiwan Tangyeh Shihyenso Yenchiu Huiyen/Rep. Taiwan Sug. Exp. Sta. 1953 : No. 10 : 1–6.

Plants resembling *Miscanthus* and with $2n = 100$–114 chromosomes were obtained from the cross 36–423 ($2n = 127$) ♀ x *M. japonicus* ($2n = 38$) ♂. It is concluded that the hybrids carry one genome from the mother plant and two from the pollen parent. Among the hypotheses discussed to account for this occurrence are the possibility that the pollinating arrow was tetraploid, and the possibility of polyspermic fertilization.

2237 Cheng, C.-F.
(The inheritance of starch grains in the parenchymatous cells of the internodes of intergeneric hybrids between sugar cane and *Miscanthus*).
Taiwan Tangyeh Shihyenso Yenchiu Huiyen/Rep. Taiwan Sug. Exp. Sta. 1953 : No. 11 : 1–6. [Chinese].

Crosses were made between sugar-cane varieties (genome O) whose internodal parenchyma is devoid of starch grains and *M. japonicus* (genome M), in whose internodal parenchyma starch grains are present. Hybrids of the OM and OOM types contained no starch; in the OMM types, starch was formed.

2238 Rao, J. T., & Babu, C. N.
Chromosome numbers in *Saccharum spontaneum*, L.
Curr. Sci. 1955 : **24** : 53–54.

The following chromosome numbers are reported: four Indian variants, $n = 20$; five Indian variants, $n = 24$; variants from East Pakistan, $n = 26$, 27 and 28; and variants from Ceylon, Uganda, Turkey and Egypt, $n = 64$.

2239 Raghavan, T. S.
Cyto-genetics in relation to sugar-cane breeding.
Cytologia, Tokyo 1954 : **19** : 133–43.

The polyploid condition and other cytogenetical features of the sugar cane are discussed in relation to problems of breeding. Diploid parthenogenesis, with or without chromosome elimination, has been observed in *S. robustum* ($2n = 84$) and Co. 602 ($2n = 118$). Many Co. canes are known to be parthenogenetic derivatives, the most recently investigated varieties being Co. 678, Co. 797, Co. 798 and Co. 811, all believed to be parthenogenetic derivatives of Co. 603. The formation of diploid eggs and, in cases of chromosome elimination, the doubling of the surviving group, are believed to be due to postmeiotic endomitosis of the spore tetrad. In both Co. 602 and *S. robustum,* the number of chromosomes eliminated is definite. All the parthenogenetic seedlings obtained from Co. 602 through selfing or crossing with distantly related genera fall into only two groups, one having the maternal diploid number and the other $2n = 96$. In *S. robustum*, seedlings with either $2n = 84$ or 62 are obtained. Possibly it is a coincidence that in both Co. 602 and *S. robustum* the number of chromosomes eliminated is 22. Eggs with unexpected chromosome numbers resulting from the combination of the processes of elimination and duplication also take part in fertilization, instances from *Saccharum* x *Sclerostachya* crosses being cited. In the author's view the occurrence of parthenogenesis and of cytoplasmic inheritance makes it necessary to choose the ♀ parent more carefully than the ♂ in breeding. He further suggests that haploid parthenogenesis offers the only possible means of obtaining a high degree of genetical purity, although no evidence of such a process has so far emerged. An attempt is being made to induce haploidy, especially by cold treatment. The author envisages future breeding as concentrated upon the production of specialized canes adapted to a limited set of environmental conditions.

2240 ARTSCHWAGER, E.
A taxonomic study of *Saccharum sinense* Roxb. and *S. barberi* Jeswiet.
Tech. Bull. US Dep. Agric. 1954 : No. 1089 : Pp. 87.

An account of the morphology of northern Indian canes pertaining to the species *S. sinense* and *S. barberi* is given, followed by full botanical descriptions of the vegetative characters of 93 clones distributed throughout the sugar-cane area of northern India and East Pakistan. A key to the clones is included and the relationship of the northern Indian canes to other canes is discussed.

2241 **Refrigerated storage of cane fuzz.**
Aust. Sug. J. 1954 : **46** : 425–27.

At Meringa, North Queensland, sugar cane seed stored at low temperatures has remained viable for periods of up to 12 months. The seed is air-dried at 90–100° F., packed together with calico bags of calcium chloride in airtight containers and kept at temperatures of 32–40° F.

2242 MARTIN, J. P., WISMER, C. A. & LO, T.-C. (translator)
(The resistance of each of the internationally grown sugar cane varieties to the most important diseases).
Taiwan Tangyeh Chikan/Taiwan Sug. Quart. 1954 : **5** : Nos. 3–4 : 195–206. [Chinese].

Extensive tables are given of the resistance of widely grown varieties to the principal diseases. The varieties are arranged serially under varietal names and numerical designations.

2243 WANG, C.-C.
(Studies on damage of sugar cane due to freezing following frost or snow).
Taiwan Tahsueh Nunghsuehyuan Yenchiu Paokao/Mem. Fac. Agric. nat. Taiwan Univ. 1953 : **3** : No. 2 : 42–43. [Chinese].

The resistance of a series of Chinese and introduced varieties to damage by frost or snow was investigated in Ssuchuan, China, in 1942 and in Taiwan in 1949–50. In general the Co. and CP varieties tested, most of which had *Saccharum barberi* or *S. spontaneum* in their ancestry, were the most resistant. Resistance was correlated with leaf thickness and the amount of fibre associated with the vascular bundles.

2244 CHONA, B. L.
Studies on the diseases of sugarcane in India. IV. Relative resistance of sugarcane varieties to red rot.
Indian J. agric. Sci. 1954 : **24** : 301–15.

The results of tests for reaction to *Colletotrichum falcatum* carried out during the period 1936–49 are tabulated and discussed. Of 206 varieties of *Saccharum officinarum, S. spontaneum* and *Sclerostachya,* 13 reacted as resistant, 82 as moderately resistant and 50 as susceptible, the remainder being in need of further testing.

2245 BRUEHL, G. W.
Identification, occurrence and distribution of strains of sugarcane mosaic in Puerto Rico.
J. Agric. Univ. PR 1954 : **38** : 188–98.

An account is given of the results of the completed survey of mosaic strains in Puerto Rico (cf. *PBA*, Vol. XXIV, Abst. 2283). Strains A, B and D, also occurring in the continental USA, made up the greater part of the mosaic collections. Strain B was the most prevalent and was the chief strain infecting BH10(12), B34104 and M336. B37161 possesses some resistance to B but D tends to increase in this variety. In testing varietal reactions, mechanical transmission of mosaic by the Seín method gave results showing a closer correlation with those obtained under field conditions than the Matz technique. The strains varied in the readiness with which they could be transmitted mechanically, strain A being the most and D the least transmissible.

2246 LIU, H. P. & LI, H. W.
Studies on the sugarcane mosaic virus in Taiwan. Part II. The mode of resistance of cane varieties and the wild relatives of cane to strains of mosaic.
Taiwan Tangyeh Shihyenso Yenchiu Huiyen/Rep. Taiwan Sug. Exp. Sta. 1953 : No. 10 : 89–102.

A report on the degree of susceptibility of a large number of cultivated and wild varieties to the three strains of mosaic known to occur in Taiwan is presented. In general, varieties of *Saccharum officinarum* are susceptible to all three strains. *S. spontaneum* 'Glagah' is immune to the short-stripe and yellow-stripe strains, immunity being dominant and polymerically determined. With the exception of one strain of Glagah which is only resistant, *S. spontaneum* is also immune to the fine-stripe strain, but the genetics of immunity in this case is uncertain. Dominant immunity to fine-stripe mosaic was found in *S. barberi* 'Chunnee.' Recessive immunity to the short-stripe and yellow-stripe strains occurs in *S. sinense*.

2247 LO, T.-T.
(**Report on investigations of ratoon stunting of sugar cane in Taiwan**).
Taiwan Tangyeh Chikan/Taiwan Sug. Quart. 1954 : **5** : No. 2 : 67–76. [Chinese].

A survey of the incidence of ratoon stunting in Taiwan during 1954 is presented. PT43–52 was the least affected of the varieties grown on a commercial scale.

2248 VENKOBA RAO, B. & LAKSHMINARAYANA BHATTA, K.
Sugarcane in Mysore—an account of recent work on varietal improvement.
Mysore agric. J. 1954 : **30** : 166–76.

Sugar-cane breeding in Mysore is briefly surveyed and a report is given of the main results of field trials of (1) HM (Hebbal Mysore) varieties, (2) IC (Irwin Canal) varieties and (3) some of the newer HM and IC canes together with a number of Coimbatore canes.

2249 LANZA, F.
Osservazioni agro-chimiche sul *Sorghum saccharatum* "Sugar" selezione Parisi. (**Agrochemical observations on selection Parisi of sugar sorghum, *S. saccharatum***).
Agricoltura Nuova 1950 : **2** : Nos. 4/5 : 1–8; also Ann. Staz. chim.-agr. Roma 1950 : Ser. **3** : Pubbl. No. 39 : 1–8.

In tests carried out near Rome in 1949 the selection in question gave a yield of 56·31 q. of dry matter per ha., with a content of 6·50% of invert sugar and 26·26% of sucrose, corresponding to a sugar yield of 18·41 q. per ha.; the yield of seed amounted to 50 q. per ha. and the variety is recommended for areas where sugar beet or maize cannot be grown.

2250 SMIRNOV, B. M. & VOROBJEVA, N. F.
(**The sweet sorghum Saratovskoe Razvesistoe**).
Agrobiologija (Agrobiology) 1954 : No. 6 : 141–43. [Russian].

In the 1953 trials, the new variety Saratovskoe Razvesistoe [Saratov Spreading] had a higher sugar content in all districts than the standards for those districts. It also yielded larger amounts of green matter in districts with an ample rainfall.

2251 ROUSSEL, N.
Le problème de l'expérimentation des variétés de betterave et ses relations avec la biométrie. (**The problem of experimentation with sugar-beet varieties and its relations with biometry**).
Publ. Inst. belge Amélior. Better. 1954 : **22** : 139–40.

Experimental designs, including balanced lattices, balanced incomplete blocks, balanced lattice squares, Youden squares, partially balanced designs, rectangular lattices and cubic lattices, suitable for comparing large numbers of varieties are discussed. Highly concordant results were obtained from two 6 x 6 simple lattice trials laid down in 1952 and by two 7 x 6 triple rectangular lattice trials conducted in 1953.

2252 Alle fonti del progresso della bieticoltura. (**At the sources of progress in beet cultivation**).
Mondo agric. 1955 : **6** : No. 8 : p. 5.

Reference is made to the importance of modern breeding methods such as the use of polyploidy, male sterility and monogerm seed in the work of the beet research station at Rovigo in northern Italy.

2253 Stehlík, V.
(My methods of breeding new cultivated varieties of sugar beet).
Za socialist. seljskohozjaĭstv. Nauk. (For socialist agric. Sci.), Praha 1954 : No. **4** : Ser. A. : 331–33. [Russian].

A brief account of sugar beet breeding in Czechoslovakia during the past 25 years is given. The methods included back crossing, technical and chemical root analyses and interspecific hybridization involving the wild beets *Beta maritima* and *B. trigyna*. The new varieties Dobrovice A, V, N and C and Zapotil yield 1–3 c. more sugar per ha. than all other varieties. In 1950, Zapotil had the highest sugar extraction rate of all varieties tested in international trials at Brussels and Dobrovice A topped the list of 48 varieties in output of roots and sugar yield in Belgian trials conducted in 1943.

2254 Curth, P.
Temperatur und Licht als blühinduzierende Faktoren bei der Zuckerrübe. 1.Mitteilung. (**Temperature and light as factors inducing flowering in the sugar beet. First communication**).
Züchter 1955 : **25** : 14–17.

At the Kleinwanzleben Plant Breeding Institute, Germany, vernalization of sugar beets at temperatures of 1–10° C. for 5, 6 or 8 weeks followed by exposure of the growing plants to long-day conditions induced a more rapid rate of transition from the vegetative to the reproductive stage. Young plants required a longer period of vernalization than older plants. The importance of this method in accelerating breeding is indicated briefly.

2255 Sedljmaĭr [Sedlmayr], K.
(**Sugar-beet breeding in Hungary and results obtained**).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1955 : No. **1** : 45–52. [Russian].

An account of the breeding of new varieties of sugar beet and mangel at Sopronhorpács is given. In recent trials in Hungary, Austria and France, Beta K91 and Beta S242/53 outyielded all other sugar beets. Their sugar contents are equal to those of the Z varieties and they give higher yields of roots than Kleinwanzleben E and I 1517. In addition, they are resistant to *Cercospora* and drought. The new mangel Rosa Beta is suitable for mechanical harvesting and produces higher yields of green matter, root and dry substance than other varieties.

2256 Kumazawa, S. & Honda, F.
(**Bud mutations in taro and a consideration of varietal formation**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 19–21. [Japanese].

Colocasia varieties from Japan, China and Taiwan are classified into 18 groups. Two bud mutants, both characterized by distinctive anthocyanin pigmentation, are described, one pertaining to the variety Yoshihama, the other to Yamagatataimo [Yamagata Field taro].

STIMULANTS

2257 Renier, A.
Classification et description des dispositifs expérimentaux. (**Classification and description of experimental designs**).
Ann. Inst. exp. Tab. Bergerac 1954 : **2** : 103–49.

Layouts suitable for tobacco trials, including complete randomization, randomized blocks, Latin and Graeco-Latin squares, factorial designs and nonorthogonal designs, are briefly described.

2258 Haney, T. G. & Lyneham, A. J. E.
The behaviour of tobacco varieties in Western Australia.
J. Agric. W. Aust. 1954 : **3** : 685–91.

The results of yield trials of Bottom Special, Hicks, Yellow Special, Broadleaf, 401, 402, Delcrest, Virginia Gold, Cross Hickory and Silver Dollar in different districts of Western Australia for two seasons and when topped and untopped are discussed.

2259 Haney, T. G.
Varietal studies of tobacco. II. Observations on a number of varieties grown in North Queensland in 1949.
Div. Rep. Div. Pl. Ind., Aust. 1951 : No. 13 : Pp. 17. (Mimeographed).

A report is given of the results of trials carried out in 1949 on 28 flue-cured tobaccos, 19 varieties of other types and on plants from 21 seed collections received from New Guinea (cf. *PBA*, Vol. XX, Abst. 2519). Of the 28 flue-cured varieties, Hicks, Yellow Special A, Silver Dollar, Bottom Special, Big Jim and Virginia Gold were the most promising. All the 21 collections displayed the characteristics of air-cured tobacco; the data suggested that there is considerable scope for improvement of the varieties at present in cultivation in New Guinea.

2260 Robinson, H. F., Mann, T. J. & Comstock, R. E.
An analysis of quantitative variability in *Nicotiana tabacum*.
Heredity 1954 : **8** : 365–76.

In investigations at the North Carolina Agricultural Experiment Station, additive genetic and dominance variances were estimated for four F_2 populations from intervarietal crosses involving Bottom Special, 402, Ky 16 and Kelin 49. Data were obtained on the following characters under a single set of environmental conditions: number of days to flowering, plant height, leaf number, leaf length and breadth, total yield of cured leaf, and weight of tobacco in each grade as separated by a US Government grader. Dominance and epistasis were found to be relatively unimportant. The estimates of additive genetic variance were of sufficient magnitude to suggest that appreciable progress in the improvement of most of the characters studied could be achieved by selection among the progenies. It was estimated that approximately 15% advance in cured-leaf yield could be effected by developing a new population from the most promising genotype. Genetic correlations between leaf yield and other characters were calculated for one population (Bottom Special x 402). The relationships indicated that selection for higher yield would on the average result in concomitant improvement in all the yield components studied, viz. height, leaf number and leaf size. The very high positive correlation between leaf yield and value of the cured leaf per acre (a quantity reflecting both yield and quality) suggested that determination of the leaf value can be omitted in breeding certain material. Assuming these results to be applicable to populations raised in other environments and to similar types of tobacco populations, it is concluded that a breeding procedure designed to accumulate the maximum number of favourable genes in homozygous genotypes should offer a more promising method of improvement than the development of commercial F_1 hybrids.

2261 Izard, C. & Hitier, H.
Cytogénétique de la descendance de mutants de l'hybride tumoral *N. glauca* x *N. langsdorffii* amphidiploide, obtenus par traitement aux rayons X. Étude comparée des prophases réductionnelles. (**Cytogenetics of the progeny of the X-ray-induced mutants of the tumerous amphidiploid hybrid *N. glauca* x *N. langsdorffii*. Comparative study of their reductional prophases**).
Ann. Inst. exp. Tab. Bergerac 1954 : **2** : 45–76.

At the Tobacco Research Institute, Bergerac, France, amphidiploid forms of *Nicotiana glauca* x *N. langsdorffii* were obtained by colchicine treatment (cf. *PBA*, Vol. XXI, Abst. 503). When the seed of these amphidiploids was subjected to X irradiation, a large number of mutants with aberrant leaf and flower formation, and also with genetically determined tumours, were obtained. Cytogenetic studies of the F_1 to F_4 generations of these mutants revealed numerous cases of asynapsis. Detailed data are presented on the morphological characters of the different types of mutant, their degree of sterility, and the course of meiosis.

2262 Fardy, A., Cuzin, J. & Schwartz, D.
La nicotinogenèse dans la descendance issue de greffes embryonnaires de *Nicotiana tabacum* L. sur quelques solanées. (**Nicotine formation in the progeny of embryo grafts of *N. tabacum* L. upon some Solanaceae**).
Ann. Inst. exp. Tab. Bergerac 1954 : **2** : 15–22.

Cotyledonary half-embryos (cf. *PBA*, Vol. XXIII, Abst. 1374) of *Nicotiana tabacum* from which the radicle had been excised (cf. *PBA*, Vol. XXII, Abst. 1320) were grafted on to adult stocks of *N. rustica*, *N. glauca* and *Datura stramonium*. Although initial growth was inhibited, some of the scions grew normally after the appearance of the first few leaves and flowered satisfactorily. Nicotine was totally lacking in grafts upon *N. glauca* and *D. stramonium* but considerable quantities were found in the scions of grafts upon *N. rustica*. A study of the progenies of scions of *N. tabacum* from all three stocks indicated that the stock had had no influence, either morphologically or as regards nicotine formation, upon the following generation.

2263 Griffith, R. B., Valleau, W. D. & Stokes, G. W.
Determination and inheritance of nicotine to nornicotine conversion in tobacco.
Science 1955 : **121** : 343–44.

Further data have been obtained indicating that conversion of nicotine to nornicotine during curing is controlled by a single dominant gene (cf. *PBA*, Vol. XIX, Abst. 1975). A paper-chromatography method is described by means of which the alkaloids of tobacco samples can be rapidly determined. Using this technique, it has been found that the factor for conversion is widely distributed among burley and flue-cured varieties.

2264 Legros, R.
Détermination des taux de nicotine et de nornicotine de quelques variétés de tabac cultivées dans le pays et de quelques hybrides à l'étude à la station. **(Estimating the nicotine and nornicotine contents of some of the tobacco varieties grown in this country, and of some of the hybrids being studied at this station).**
Bull. Inst. agron. Gembloux 1954 : **22** : 235–40.

The author presents a survey of the literature on methods of determining the nicotine and nornicotine contents of tobacco leaves. Tabulated data on the percentage of these two alkaloids found in varieties and hybrids grown at the State Experiment Station for the Improvement of Crop Plants, Gembloux, Belgium, are included.

2265 Akehurst, B. C.
Turkish or Oriental tobacco in Southern Rhodesia.
Emp. J. exp. Agric. 1954 : **22** : 267–80.

Of 72 varieties of Turkish tobacco of varying provenance tested in Southern Rhodesia, varieties of the Smyrna type were generally superior in both yield and quality to other varieties.

2266 Clayton, E. E.
Identifying disease resistance suited to interspecific transfer.
J. Hered. 1954 : **45** : 273–77.

The author discusses the use of wild species in breeding for disease resistance, in the light of his experience of tobacco breeding (cf. *PBA*, Vol. XXIV, Abst. 273). His investigations have led to the following general conclusions: (1) valuable resistance to disease is not to be found in the wild species, e.g. *Nicotiana sylvestris* and *N. tomentosa*, closely related to *N. tabacum*; (2) resistance or immunity to various diseases has been found in some distantly related species possessing little chromosome homology and low crossability with tobacco; and (3) probably the only types of disease reaction justifying the time and expense involved in an interspecific transfer are (*a*) dominant monogenic immunity or resistance and (*b*) if no adequate resistance can be discovered in the cultivated species and in the case of a major disease, a high level of polygenically conditioned resistance with intermediate dominance. In order to obtain some indication whether resistance to a particular disease is dominant and possibly monogenic, or incompletely dominant and possibly polygenic, the allopolyploid or, in some cases, the chromosomally balanced F_1 hybrid with *N. tabacum*, should be tested for its reaction in comparison with the parent species under consideration as a source of resistance. In contrast to Valleau's results (cf. *PBA*, Vol. XXII, Abst. 2900), tests of the allopolyploid *N. longiflora-N. tabacum* indicated that the blackshank immunity of *N. longiflora* is not dominant and tests of the back-cross progeny have not provided evidence that this character is monogenically determined.

2267 Oberthür, K.
Über die Anfälligkeit verschiedener Tabak-Arten, -Sorten und -Zuchtstämme gegen *Thielavia basicola* (B. et Br.) Zopf. **[On the susceptibility of various species, varieties and pedigree lines of tobacco to *Th. basicola* (B. et Br.) Zopf.]**
Züchter 1955 : **25** : 17–26.

After presenting a comprehensive survey of the literature on interspecific and intervarietal differences in susceptibility, the author goes on to give an account of recent trials at the Tobacco Research Institute, Wohlsdorf-Biensdorf, Germany. Although all the 144 varieties and breeding lines of *Nicotiana tabacum* that were tested proved susceptible, some, for example Wohlsdorfer 212, suffered considerably less damage than others; selection for resistance may therefore be possible. All 24 varieties of *N. rustica* tested were resistant.

2268 **Report of the Commission of Enquiry on the Scientific Department of the Indian Tea Association, London and Calcutta 1953-1954** (1954) : Pp. 162.

The report of the Commission appointed to review the research and advisory work of the Tocklai Research Station in relation to the tea industry of north-east India is presented. Section V, concerned with research on tea growing, refers to genetical, breeding and taxonomic work. Among the topics considered in section VIII, dealing with quality, is the problem of evaluating small experimental samples. Appendix IV, a review of past, present and future work at Tocklai, compiled by the senior officers and edited by the director, contains a survey of the principles upon which breeding is based.

2269 **Annual report for the year 1952.**
Bull. Tea Res. Inst. Ceylon 1954 : No. 34 : Pp. 55.

Of the 56 new mother bushes of tea selected, 23 were chosen with a view to their possible resistance to eelworm (*Pratylenchus pratensis*). Selection of bushes for resistance to blister blight is now becoming difficult as the result of the widespread adoption and success of the recommended measures of protection; selection is however being continued as material with further improvement in yielding capacity and disease resistance may be discovered. Of the clones in the block established in 1947, six gave yields ranging from 1485 to 2295 lbs. per acre in the second year of plucking.

2270 INABA, T.
(On polyploidy in the tea plant. III. The occurrence of a spontaneous tetraploid).
Chagyo Kenyu Hokoku/Tea Res. J. 1954 : No. 3 : 1–5. [Japanese].

A description of a tetraploid plant, believed to have been derived from a mother plant of the Japanese triploid strain U-24, is given. The tetraploid displayed the usual gigas characteristics; meiosis showed some irregularity and fertility was reduced.

2271 HARADA, K., MURAKAMI, M. & UMEKAGE, O.
(Studies on tea breeding. I. Studies on the artificial induction of polyploidy in tea).
Saikyo Daigaku Gakujutsu Hokoku, Nogaku/Sci. Rep. Saikyo Univ. Agric. 1953 : No. 5 : 135–41. [Japanese].

Four plants with stomata of increased size, which are presumed to be tetraploids, have been obtained by treating the buds of normal plants with colchicine.

2272 HARADA, K., MURAKAMI, M. & MUTSUURA, O.
(Studies on the breeding of the tea plant. II. Studies on the "leaf smear method" for the early discrimination of colchicine-induced changes in connexion with breeding polyploids).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **4** : No. 1 : 18–20. [Japanese].

Leaf-bud smears of colchicine-treated tea plants, stained either in acetocarmine or acetoorcein, have proved of value in detecting polyploid shoots.

2273 **Twentieth annual report of the coffee research and experimental station, Lyamungu, Moshi for the 1953/54 season.**
Pamphl. Dep. Agric. Tanganyika 1954 : No. 60 : Pp. 43.

A detailed report of the results of trials on clonal selections and on seedling progenies of potential selections is included. The progeny plots of KP423, grown on a multiple-stem system, gave the highest yield; this clone is regarded as outstanding; its mean yield over its first seven years of bearing is 16·50 cwt. per acre. The selections within Kents are higher in yielding capacity than those from the variety Bourbon. Comparison of the yields of clones *vs.* seedlings of the same parentage continued. Progenies of Bourbon have been of consistently good quality.

2274 **Annual Report of the West African Cacao Research Institute, Tafo, Gold Coast, April, 1953 to March, 1954** : Pp. 52.

Hybrids between West African selections and introduced types are significantly more vigorous than either the Amelonado or "local hybrid" selection with which they are being compared. Identification of genes for sterility is now almost complete for all types of introduced Amazon cacao.

2275 **A Report on Cacao Research at the Imperial College of Tropical Agriculture, St. Augustine, Trinidad, 1953** : Pp. 87.

In addition to the work described in the papers summarized below, research on clonal grafting is in progress and breeding work has been carried out. Amazonian material is being investigated for resistance to witches' broom disease with the aim of selecting ten parents for hybridization with five ICS clones. Crossing and selfing of F_1 inbreds of ICS1 and ICS45 were continued. An ICS1 selfed progeny appears to be homozygous for a marker character, axil spot, and is undergoing tests; if these prove satisfactory the material may be of value in the study of natural pollen transference. Progeny of ICS1 x M8 crinkle dwarf and of RT18 selfed have been established with a view to investigating the inheritance of the crinkle dwarf factor and thrips resistance respectively.

2276 *Baker, R. E. D., Cope, F. W., Holliday, P. C., Bartley, B. G. & Taylor, D. J. The Anglo-Colombian cacao collecting expedition. (pp. 8–29).*

The wild and cultivated forms of *Theobroma cacao*, 13 other *Theobroma* species and ten *Herrania* species collected during the 1952–3 expedition to Colombia are briefly described and notes are given on the incidence of witches' broom, *Monilia* and insect pests. The genus *Herrania* is apparently never attacked by witches' broom. Much of the material collected is now well established in Trinidad.

2277 *Holliday, P. C. The susceptibility of some Imperial College selections to witches' broom disease. (pp. 58–63).*

In experiments conducted in Trinidad, clones which produced many fan and cushion blooms tended also to show a high degree of pod infection. The most resistant clones were ICS6, 45, 91, 95 and 98.

2278 BURGOS L., J. A.
Investigaciones sobre el cacao en Jaén. (**Investigations on cacao in Jaén**).
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1954 : **3** : No. **1** : 2–7.

Observations made on the fruits of a number of selected cacao trees growing in the Jaén zone of northern Peru showed that the Forastero type predominates, although an appreciable proportion of the trees show certain characteristics of Criollo, particularly in the lighter colour of the seed. Selection is based on amount of kernel, light seed colour, number of fruits required to produce 1 kg. of cocoa, which should be 9 or under, total yield per tree, which should be 1·5 kg. or over, and resistance to witches' broom.

2279 GARCÍA BECERRA, C.
Nuevos aspectos para la selección de cacao en Colombia. (**New aspects of cacao selection in Colombia**).
Cacao en Colombia 1952 : **1** : 5–30.

A review is given of the results of cacao breeding in Trinidad, the Gold Coast, Nigeria, Java, Ecuador, Costa Rica and Colombia. At the Palmira research station in Colombia seedlings 1, 3, 5 and 6 have proved outstanding in yielding ability and are being used for the production of clones. In a study of 200 trees, comprising both Criollo and Trinitario types, only 5 trees gave yields varying between 1100 and 1700 kg. of dry cocoa per year. In this respect, as also in the weight of fresh bean per fruit, number of beans per fruit and number of fruits per tree the figures were very different from those published in Trinidad and different criteria for selection had to be used. This is largely owing to the introduction at the turn of the century of cacaos such as Pajarito [Little Bird], possessed of greater disease resistance but inferior in quality to the original Criollo, with which they have later hybridized: the hybrids of the Pajarito type later came to be known as Calabacillo [Little Pumpkin], those of the Criollo type as Angoleta, Cundeamor and Amelonado. Almost all Colombian cacao plantations now consist of mixed populations from these crosses and contain a number of inferior types, particularly a number of self-incompatible trees giving little or no yield; some plantations contain up to 50% of such trees. This high incidence of self incompatibility is thought to have arisen from a combination of self-incompatible genes in the Pajarito introductions with others already present in the Criollos. Selection is being aimed at a type free from self incompatibility, conforming as closely as possible to the pure Criollo type and possessed also of the necessary yielding ability and resistance to diseases.

2280 GNANARATNAM, J. K.
Pollination mechanism of the cacao flower.
Trop. Agriculturist 1954 : **110** : 98–104.

Investigations at Kundasale, Ceylon, showed that the duration of the receptive period of the stigma varied from tree to tree; receptivity may be retained up to 24 hours. Considerable variation in pollen production was also noted among individual trees. Pollen grains remained viable for 12 hours. The flowers did not set any pods without the assistance of a pollinating agent, probably in the form of insects. The possibility of some wind pollination cannot however be excluded. In a study of the compatibility relationships of 19 trees, some proved to be both self compatible and cross compatible whereas others were self incompatible but cross compatible with self-compatible individuals. Self-compatible trees set pods with pollen from self-incompatible trees as well as from other self-compatible individuals. Sterility may be due not only to self incompatibility but also to structural sterility.

2281 NAUNDORF, G.
Contribución al estudio de la polinización, fecundación y fructificación en el cacao. (**Contribution to the study of pollination, fertilization and fruit formation in cacao**).
Cacao en Colombia 1952 : **1** : 55–70.

Fruit and seed set in self-compatible trees is influenced by shading and season, and can be affected by plant growth substances and various fungicides and insecticides. A number of the cacao trees growing in Colombia are self-incompatible (cf. *PBA*, Vol. XXIII, Abst. 2888). Self incompatibility has been overcome in certain cases by the application of vitamin B, and of p-chlorophenoxyacetic acid.

2282 **Administration Report of the Director of Agriculture of the Colony of Trinidad and Tobago, for the year 1953** (1954) : Pp. 70.

It is briefly reported that progress has been made in the breeding and selection of cacao clones resistant to witches' broom. Clones SCA9, SCA19, PA218 and SPI (formerly CC7) were added to the list of parent trees used for crossing in this work.

2283 İNCEKARA, F.
Türkiye haşhaş çeşitleri ve bunların tohum ve afyon bakımından değerleri. (**Turkish poppy varieties and their value with respect to seed and opium**).
Ankara 1949 : Pp. 376.

A detailed account is given of the variation observed in some 1300 selections derived from 175 populations collected from different regions in Turkey. The characters described include pigmentation, pubescence, habit, leaf shape, capsule morphology, seed and oil yield, and opium and morphine content. A botanical classification of the forms collected is given. The following characters were correlated: (1) seed yield, stigma number and capsule width; (2) high oil content and white or yellow seed colour; and (3) high morphine content and shiny green capsules.

2284 Blauwmaanzaad, 1955. (**Opium poppy, 1955**).
Landbouwvoorlichting 12 : Bijl. 2; Ber. Rassenkeuze 1955 : No. 181 : unpaginated.

Data on yield, quality of seed and morphological characteristics of the four varieties most widely grown in the Netherlands are presented. In variety trials in 1954, Eckendorf and Noordster [Northern Star] gave the highest yields.

2285 ASKEW, H. O. & MONK, R. J.
An inverse relationship between resins and sugar contents of hop cones.
J. Inst. Brew. 1955 : **61** : 32–39.

"In cured hop cones from 46 samples derived from 17 varieties, statistically significant negative relationships were found between glucose, fructose, and total reducing sugar contents on the one hand, and α–resin and total petroleum-ether soluble solids on the other. High sugar content is therefore found with low resin content. The same relationships occurred in a given variety where the material was derived from different clones. For a given clone these correlations held for material obtained in different seasons."

[Authors' summary].

MINOR CROP PLANTS

2286 KRUPKO, S., ISRAELSTAM, G. F. & MARTINOVIC, B.
Embryosac development and chromosome number in *Vanilla roscheri* from Inhaca Island.
S. Afr. J. Sci. 1954 : **51** : 115–17.

The embryo sac of *V. roscheri* is 8-nucleated, in contrast to the 6-nucleated type in *V. planifolia*. The former species was also found to have $2n = 36$, whereas $2n = 32$ has been recorded for other species. It is noted that *V. madagascarensis*, a species very similar to *V. roscheri*, has been used in Madagascar in crosses with *V. planifolia*, as a source of disease resistance.

2287 NISHIYAMA, I. & KARASAWA, H.
(**Studies on artificial polyploid plants. XVIII. On impeded development in triploid hybrids of *Capsicum***).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 36–40. [Japanese].

A high proportion of aborted seeds was obtained from direct and reciprocal crosses between diploid and tetraploid strains of *C. annuum* 'Takanotsume.' Of the viable seeds, two gave rise to diploid and three to triploid plants. The meiotic configuration of the triploids varied from $12_{II} + 12_{I}$ to 12_{III}. Chromosome elimination took place at metaphase II. The triploids were practically sterile.

2288 LUTES, D. D.
Inheritance of resistance to systemic tobacco mosaic infection in pepper.
Diss. Abstr. 1954 : **14** : Publ. No. 9188 : 1900–01.

Varieties and experimental lines of *Capsicum frutescens* displayed four types of reaction to common tobacco mosaic virus, similar to those reported by Holmes, who postulated that three factors, L, l and l^1, members of a multiple allelic series, were responsible for the different reactions (cf. *PBA*, Vol. VIII, Abst. 209). L was found to be completely dominant over l^1 and l; l^1 showed incomplete dominance over l. Localized necrosis was determined by the genotypes LL, Ll^1 or Ll, delayed necrosis by l^1l^1, systemic chlorosis by ll and systemic necrosis by l^1l. Two hybrid selections with complete resistance to systemic virus infection and comparing favourably with California

Wonder have been developed by making use of the localized necrotic reaction, but they require further selection before distribution for commercial cultivation.

2289 Anhaeusser, H.
Zur Echtheitsbestimmung von Raps- und Rübsensaatgut. (**On determining the purity of rape and turnip-rape seed**).
Angew. Bot. 1954 : **28** : 13–40.

A detailed examination of the anatomical structure of the testa, of the morphology of the seedlings and of the appearance of the seed and seedlings under the fluorescent microscope was made, using 10 German rape and 4 German turnip-rape varieties. Seedling characters were the most satisfactory for discriminating between rape and turnip rape; the two types of crop plant could not be satisfactorily distinguished by means of the fluorescent microscope. Rape and turnip rape could usually be distinguished by testa characters but the distinction was not absolute, and selfing experiments and rape x turnip-rape crosses showed that both crops were variable in respect of testa characters and that types of testa structure intermediate between those characteristic of either rape or turnip rape also occurred.

2290 Togari, Y. & Kanno, C.
(**On the relation between spring habit and vernalization in rape varieties**).
Kanto Tosan Nogyo Shikenjo Kenkya Hokoku/J. Kanto-Tosan agric. Exp. Sta. 1953 : No. 4 : 11–18. [Japanese].

Data are given on the effect of vernalization treatments of various lengths on the vegetative cycle of 21 varieties in 1940 and on 8 varieties in 1942.

2291 Togari, Y. & Kanno, C.
(**On the relation between spring habit, sensitivity to temperature and sensitivity to illumination in rape varieties**).
Kanto Tosan Nogyo Shikenjo Kenkyu Hokoku/J. Kanto-Tosan agric. Exp. Sta. 1952 : No. 3 : 29–42. [Japanese].

The vegetative period of numerous varieties was determined under normal conditions and under long photoperiods and at high temperatures. It was found that, as spring habit became more pronounced, so did the curtailment of the vegetative cycle under the high temperature conditions increase. There was no correlation between spring habit and response to long photoperiods.

2292 Togari, Y. & Kanno, C.
(**Acceleration of bolting in rape under the influence of temperature and day length and its mechanism**).
Kanto Tosan Nogyo Shikenjo Kenkyu Hokoku/J. Kanto-Tosan agric. Exp. Sta. 1954 : No. 5 : 20–27. [Japanese].

A series of Japanese varieties were sown in the field and then transferred at various stages in development to a heated greenhouse. In some cases, they were subjected to 15 days' chilling at −2° C. just before transplantation. The effect of photoperiods of various lengths at this stage was also investigated. In general, bolting was advanced by delaying transportation to the greenhouse and by chilling; this effect was especially marked in varieties with the most pronounced spring habit. After a critical date, however, further delay in transportation led to a progressive lengthening of the bolting period. Light had little effect on bolting.

2293 Poole, D. D. & Hadley, H. H.
Haploidy in castorbeans.
J. Hered. 1954 : **45** : 285–88.

Spontaneous haploids ($2n = 10$) occurring in the breeding nursery of the Texas Agricultural Experiment Station and in commercial fields at Chillicothe, Tex., closely resembled normal plants in height, stem size and growth habit but could be distinguished by their small leaves and highly sterile racemes. Their meiotic behaviour was similar to that usually found in haploid forms in other genera.

2294 Kawanishi, R.
(**Studies on sesame varieties. II. On the effect of transplanting and on oil content**).
Shizuoka Daigaku Nogakubu Kenkyu Hokoku/Rep. Fac. Agric. Shizuoka Univ. 1953 : No. 3 : 28–35. [Japanese].

Comparative analyses of 15 varieties showed that white varieties had the highest oil content and were followed, in decreasing order of oil content, by the yellow, brown and black sesames.

2295 Hansen, D. R. & McGregor, W. G.
Comparative growth studies of flax varieties.
Canad. J. agric. Sci. 1954 : **34** : 565–72.

In a study of the linseeds Redwing, Raja, Redwood, Ottawa 770B and Ottawa 3693A, significant varietal differences were found in the rate of stem elongation. A significant negative correlation was detected between number of days to flowering and rate of stem elongation in each variety. The varieties did not differ significantly with respect to rate of dry-weight increase. The interactions of variety x year for rates of stem elongation and dry weight increase were not significant.

2296 Gray, S. G.

Trials with introduced linseed varieties in southern Queensland.

Tech. Pap. Div. Pl. Industr. Aust. 1954 : No. 3 : Pp. 19.

Trials of over 150 varieties and strains were carried out during the period 1945–51. Introductions showing promise fell into two groups: (1) several early maturing Indian varieties with high yielding ability, high oil content and a short, well-branched habit; and (2) several varieties from widely separated geographical sources. The Indian varieties are considered to be the most satisfactory as regards agronomic type. They were however susceptible to rust and cannot therefore be recommended for commercial use. Varieties in group (2), although less satisfactory in agronomic type, showed rust resistance and appear to merit extensive trial in comparison with Walsh. Among the varieties in this group are Malabrigo, Newland, Viking, Hindi, Récolte 0189 and Récolte 0196. Breeding to develop a rust-resistant variety with improved agronomic characters, using Indian or Ethiopian types, is advocated.

2297 Dickey, R. D., Gilbert, S. G. & Gropp, C. M.

The genus *Aleurites* in Florida.

Bull. Fla. agric. Exp. Sta. 1952 : No. 503 : Pp. 40.

The botanical characteristics of *A. fordii*, *A. montana*, *A. cordata*, *A. moluccana* and *A. trisperma* are described. With the exception of *A. moluccana*, these species contain α-eleostearic acid in their oils, *A. fordii* having the highest content and *A. trisperma* approximately one half, *A. cordata* two-thirds and *A. montana* five-sixths the amount in the oil of *A. fordii*. Oils from *A. montana* and *A. montana* x *A. fordii* hybrids differ only slightly in composition from *A. fordii* oil. Apart from its lack of α-oleostearic acid, the oil from *A. moluccana* shows wide differences in chemical and physical properties from the oils of the other species. The value of the different species in breeding is briefly discussed with reference to their oil characteristics.

2298 Berdyšev, A. P.

(Biology of the development of the oil sunflower in Moscow province).

Agrobiologija (Agrobiology) 1954 : No. 6 : 20–35. [Russian].

The results of variety trials of sunflower in the Nonchernozem Belt are given. Some new varieties developed at Nemčinovka outyielded the standard Barnaul 2151. Data on maturation period, 1000-kernel weight, oil and husk contents, amount of phytomelan and resistance to grey rot are presented.

2299 Rendements obtenus en plantation par l'utilisation de graines d'*Elaeis* sélectionnées à Yangambi. **(Yields obtained in the plantation by the use of seeds of *Elaeis* bred at Yangambi).**

Bull. INEAC 1954 : **3** : 331–32.

Promising results were obtained at Binga, Belgian Congo, from *dura* x *pisifera* hybrids obtained from Yangambi.

2300 **Report of the Wattle Research Institute of the University of Natal for 1953-1954** (1954) : Pp. 57.

Most of the S_2 generation of a number of green wattle trees (*Acacia decurrens*) were smaller in height and diameter than the corresponding open-pollinated progenies. Segregation for a recessive gene causing short, bushy habit occurred in both the S_2 and the open-pollinated progeny of a single tree, G28, the ratio of normal to recessive, agreeing in each case with a **15 : 1** expectation.

F_2 families, back-crosses to black wattle and open-pollinated progeny of green x black wattle are being scored for leaf characters, date of flowering, ripening period and prominence of stem ridges.

The following hybrids have been produced: *A. mollissima* x *A. baileyana*, *A. mollissima* x *A. decurrens*, *A. mollissima* x *A. dealbata* and *A. dealbata* x *A. decurrens*. Chlorotic first leaves were found in the seedlings of all the crosses.

Recessive characters have been observed in twelve selfed lines of black wattle, and there is evidence that dwarf habit, curly leaves and reduced leaves are associated.

Tetraploids exposed to open pollination by diploids produced a preponderance of tetraploid seedlings with $4x = 52$. A few aneuploids with $4x \pm 1$ or 2 chromosomes, a triploid with $3x = 39$ and an aneuploid triploid with $3x - 1$ chromosomes were also obtained. Measurements made on seedling leaves showed that most tetraploids had large stomata with a range of size outside that of the diploids.

Progeny trials have been continued at Bloemendal and completed at Sweetwaters. At the latter station, the mean diameter of black wattles measured at two years and the height measured at three years were positively correlated with the final bark yield, there being significant differences between the progenies of different trees. In green wattle, diameter and yield were also correlated and families differed significantly in yield. There appeared to be no consistent relationship in either species between the vigour of the parent and that of its offspring.

2301 RAO, H. S.
Pollination mechanism in *Acacia catechu*.
J. Indian bot. Soc. 1954 : **33** : 93–97.

Attempts to cross *A. catechu* with *A. decurrens* and *A. mollissima* at the Forest Research Institute, Dehra Dun, by fertilizing emasculated flowers of *A. catechu* by pollen transported from southern India, failed. Studies of the mode of pollination in *A. catechu* indicated that the grains are aggregated into pollinia, each consisting of 16 viable grains, and that the anthers bear stipitate glands. The anthers of *A. chundra* and *A. decurrens* also contain pollinia. The general technical problems of controlled hybridization of forest trees are briefly discussed.

2302 KERBOSCH, M.
Episoden uit de geschiedenis van de kina. (**Episodes from the history of cinchona**).
Bergcultures 1955 : **24** : 24–28.

v.H.
Uit vergeelde bladen. Een bezoek aan Tjinjiroean in 1857. (**From yellowed documents. A visit to Tjinjiroean in 1857**).
Ibid. 1955 : **24** : 29–32.

VAN ZWET, A. J.
Honderd-jaar kinacultuur in Indonesië. (**A century of cinchona cultivation in Indonesia**).
Ibid. 1955 : **24** : 40–43.

The above articles give a history of the cultivation of *Cinchona* in Indonesia since its introduction from South America in the middle of the nineteenth century. The main species grown are described briefly and mention is made of selection for improved yield at Bangor and other centres.

2303 SUZUKA, O.
Chromosome numbers in pharmaceutical plants II.
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : p. 79.

The chromosome numbers of *Aconitum japonicum*, *Amsonia elliptica*, *Artemisia brevifolia*, *Artemisia kurramensis* and 28 other species of various genera are listed.

2304 QUAZILBASH, N. A.
A study of *Artemisia brevifolia* Wall.
Pakist. J. For. 1954 : **4** : 196–99.

The santonin-containing form of *A. brevifolia* was found to be tetraploid ($2n = 36$) and the santonin-free form hexaploid ($2n = 54$). Strains of the $4n$ form showing marked differences in santonin content occur, as the result, it is believed, of genetic differences and variation in ecological conditions. It was established that *A. brevifolia* ($2n = 36$) from Kashmir is botanically distinct from *A. kurramensis* ($2n = 18$), from Kurram.

2305 WEIN, K.
Die Geschichte von *Datura stramonium*. (**The history of *D. stramonium***).
Kulturpflanze, Berlin 1954 : **2** : 18–71.

This account of the history of *D. stramonium* includes a review of its cultivation by the American Indians and of its introduction into Europe, where it was grown as a vegetable and medicinal plant, in the seventeenth century.

2306 **Report of the work of the Rubber Research Board of the Rubber Research Institute, Ceylon, in 1953**
(1954) : Pp. 116.

A study of seedling families from the earlier crosses now in tapping has shown that the local clones MK3/2, WG6278RLD8 and HC28 are reliable as seed parents. Clones TJ1 and TJ16, already known to be good seed parents, have crossed well with these clones. Legitimate seedling families involving clone PB86 have given promising results in the first year of tapping. In the hand-pollination programme for 1953, the parents included a number of new high-yielding RLD clones and the *Oidium*-resistant clone LCB870.

2307 PAARDEKOOPER, E. C.
Het *Hevea*-selectiewerk van het Proefstation der C.P.V. (***Hevea* selection work at the CPV Experiment Station**).
Bergcultures 1955 : **24** : 7–11.

A general review of current breeding work at the Central Experiment Station, Bogor, Indonesia, and at the Peweja, Parung Pandjang and Tjiomas substations is presented. Emphasis is being laid on selection for resistance to diseases, in particular brown bast. Crosses are being carried out with a view to combining the mildew resistance and rapid growth of LCB870 with the high rubber yields of other clones. Crosses involving LCB1320, GT1 and WR101 have also been effected. Fresh breeding material is to be introduced from Malaya, Ceylon and Indochina.

2308 Amand, H.
La sélection de l'hévéa à Yangambi. (**Selection of rubber trees at Yangambi**).
Bull. INEAC 1954 : **3** : 317–30.

This review of the activities of the Rubber Division of the Yangambi Research Station during the past 25 years presents a brief history of the introduction of *Hevea* into the Belgian Congo and an account of hybridization and selection work in progress at the present time. The criteria employed in choosing potential mother trees, the organization of clonal trials and the employment of Bobilioff's method of chemical analysis in distinguishing between clones are outlined and the possibilities of improving stock by the introduction of new material from the Amazon basin are discussed.

2309 **RRIM'600' series—further observations.**
RRI Plant. Bull. 1955 : No. 16 : 3–9.

Information is provided on the characters of the rubber clones RRIM 600 to 630, as observed in large-scale trials at the Sungei Buloh Experiment Station, Selangor, Malaya. The yield records for 1953 from the small-scale trials of these clones are also given (cf. *PBA*, Vol. XXIII, Abst. 2917).

2310 Kappert, H.
Experimentelle Untersuchungen über die Variabilität eines Totalapomikten (*Taraxacum officinale* Web.). [**Experimental investigations on the variability of a total apomict (*T. officinale* Web.)**].
Ber. dtsch. bot. Ges. 1954 : **67** : 325–34

Having discussed the theories of H. Nilsson (cf. *PBA*, Vol. XVII, Abst. 575) and of Sörensen and Gudjónsson (cf. *PBA*, Vol. XVI, Abst. 1869) on the above subject, the writer describes his own observations on totally apomictic strains of microtypes of *T. officinale*. Euploid and aneuploid changes in the genome and, to some extent, recombination of genes are suggested as mechanisms whereby a certain degree of plasticity might be introduced into the genotype of the total apomict, thus enabling it to survive environmental changes which might have an adverse effect on the survival of a completely stable genotype.

2311 Notcutt, L. A.
Oil-gland count as an approximate means of evaluating pyrethrum flowers.
Pyrethrum Post 1955 : **3** : No. 4 : 9–14.

A strong positive correlation was found between the total pyrethrin content of the flower head and the number of oil glands on the achenes. The technique used in counting the oil glands is described and recommended as a convenient method of selecting plants of high pyrethrin content for breeding.

FRUITS AND NUTS

2312 Zeller, O.
Beginn der Blütenphase bei den Infloreszenzknospen einiger Kern- und Steinobstsorten. (**The beginning of the flowering phase in the inflorescence buds of some pome and stone fruit varieties**).
Angew. Bot. 1954 : **28** : 178–91.

Observations on the time of differentiation of the flower primordia of a series of varieties of apple, pear, cherry and peach grown at the Horticultural Institute at Stuttgart-Hohenheim, Germany, are presented. Varietal differences in the date of differentiation were noted.

2313 Schuphan, W.
Massnahmen zur Förderung des biologischen Wertes unseres Obstes. (**Measures to improve the biological value of our fruit**).
Arch. dtsch. LandwGes. 1954 : **14** : 59–70.

Improved taste, increased nutritional value and higher vitamin C content are stated to be the most desirable objectives in fruit breeding in Western Germany. Data on the vitamin C content of some apple varieties and on vitamin C, sugar and acid contents of a number of strawberry varieties are given.

2314 Neubauer, H. F.
Bemerkungen über das Vorkommen wilder Obstsorten in Nuristan. (**Observations on the occurrence of wild fruit trees in Nuristan**).
Angew. Bot. 1954 : **28** : 81–88.

Brief descriptions and notes on the geographical distribution and history are given for the following fruit-tree species that occur spontaneously in eastern Afghanistan: vine, apricot, almond, some sour cherries, walnut, pomegranate, black mulberry, *Diospyros lotos* and *Ziziphus vulgaris*.

2315 Bagenal, N. B.
History and development of the cultivated fruits (Part V).
Rev. Ass. Agric., Lond. 1955 : No. 26 : 8–17.

A popular account of the cultivation and origins of the peach, nectarine, apricot, fig, black mulberry and grape continues this series of articles on cultivated fruits commonly grown in Europe and America (cf. Abst. 490).

2316 SCHANDER, H.
Ein automatisches Mess- und Zählgerät für Massenuntersuchungen. (**An apparatus for automatically measuring and counting in mass examinations**).
Züchter 1955 : **25** : p. 80.

The apparatus described originates from the Technical University, Hanover, and facilitates rapid statistical evaluation of stem thickness in pome fruits. It may also be employed for measurements of fruit and seed size.

2317 KEMMER, E. & THIELE, I.
Frostresistenzprüfungen an keimenden Kernobstsamen. (**Testing for frost resistance in germinating seeds of pome fruits**).
Züchter 1955 : **25** : 57–60.

In experiments at the Institute of Fruit Cultivation, Berlin-Charlottenburg, the resistance of germinating seeds of apple and pear varieties to temperatures of between —1·5° C. and —5·5° C. for several days tallied closely with information already available on the frost resistance of the adult varieties. It is suggested that this method may be of value in breeding as it enables the frost resistance of new varieties to be ascertained at an early stage of development.

2318 KARNATZ, H.
Das Verhalten sortenreiner Kernobstsämlinge im ersten und zweiten Lebensjahr als unveredelte Pflanze. (**The behaviour of the seedlings of pure varieties of pome fruits in their first and second years as ungrafted plants**).
Gartenbauwiss. 1955 : **1** : 325–39.

The results of preliminary trials at the Jork Fruit Experiment Station, Bavaria, indicate that the apple varieties Antonovka, Bittenfelder, Grahams Jubiläum [Graham's Jubilee] and Kleiner Langstiel [Small long-stalked] and the pear Kirchensaller Mostbirne [Kirchensall perry pear] are satisfactory as rootstocks from the point of view of their root development and resistance to mildew and other diseases. They have not, as yet, been tested for frost resistance.

2319 CLARKE, W. S. (Jun.)
A new apple variety.
Hort. News, NJ 1954 : **35** : p. 2835.

The variety Delcon, originating from the cross Delicious x (Jonathan x Ben Nevis), released by Missouri Agricultural Experiment Station, is a heavy-bearing tree of about half the normal size on all rootstocks tested. The red fruit is of good storage quality.

2320 LANTZ, H. L.
Report on promising cross bred apple seedlings.
Iowa St. hort. Soc. 1953 (1954) : **88** : 86–99.

Descriptive notes are given on three seedlings which are giving an outstandingly good performance at the Iowa Agricultural Experiment Station: A611 (Jonathan x Delicious), A609 (Patten 1015 x Delicious) and A558 (Delicious x Harrington). All three seedlings are highly resistant to fire blight.

2321 LAVRIK, P. I.
(**Producing vegetative hybrids of apple**).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 734–43. [Russian].

Experiments at Leningrad suggest that whereas the scion produces heritable changes in the rootstock, the effect of the stock upon the scion is only temporary. Brief descriptions of vegetative hybrids obtained by grafting old varieties of apple on phasically young stocks are given.

2322 CRNČEVIĆ, V.
Mehanički i hemiski sastav i tehnička upotrebljivost jabuka resanskog područja (NR Makedonija). [**Physical and chemical composition and technological utilization of apples in the Resan region. (People's Republic of Macedonia)**].
Arh. poljopr. Nauk. 1954 : **7** : No. 17 : 41–61.

Tabulated data on the quality and chemical composition of the juice of a number of Macedonian and introduced varieties are presented. Boskoop, Reinette de Coux, Winesap and Red Calville proved the most suitable for the commercial manufacture of apple juice. Some acid local varieties, such as Petrika, can be used if their juice is blended with that of introduced varieties.

2323 GRUPPE, W.
Vergleichende Blatt- und Bodenuntersuchungen in Apfelplantagen und -baumschulen unter besonderer Berücksichtigung von Kalium und Magnesium. (**Comparative leaf and soil investigations in apple orchards and nurseries with special reference to potassium and magnesium**).
Gartenbauwiss. 1955 : **1** : 291–312.

Varietal differences in the mineral contents of apple leaves were observed in experiments conducted at the Institute of Fruit Cultivation of Hanover Technical College. Ash obtained from the leaves of Boskoop contained comparatively high percentages of calcium, magnesium and potassium, in contrast to Berlepich, the leaves of which had a low content in all three of these elements. Goldparmäne (Golden Pearmain] had a high content of calcium and magnesium but a low potassium content; in the case of Cox, the reverse applied. Choice of rootstock exercised a considerable influence on the ability of a variety to obtain from the soil those minerals which it required. Varieties which, under normal conditions, had a high content of any given mineral suffered the most severely when the soil was deficient in this substance.

2324 Veredelingsdag fruitgewassen 1954. (**Meeting of fruit-tree breeders, 1954**).
Meded. Inst. Vered. TuinbGewass. 1954 : No. 59 : Pp. 40.

The above meeting was held in Wageningen and was devoted exclusively to the apple-growing industry. Subjects discussed included the commercial utilization of apples, the breeding of new cooking and preserving varieties with a high vitamin C content, the requirements of the home and export markets as regards keeping properties and transportability and the economic aspect of breeding for disease resistance. In the concluding address, A. S. de Bruyne mentioned recent trials at Wageningen. Antonovka and Northern Spy are being used in breeding for resistance to scab and woolly aphis respectively. Wild scab-resistant species are being treated with colchicine to obtain tetraploids that will later be crossed with susceptible tetraploid varieties. Breeding for improved resistance to frost is also in progress at Wageningen.

2325 Budagovskiĭ, V. I.
(**Winter hardiness of the root systems of dwarfing and semidwarfing rootstocks of apples**).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1954 : No. 6 : 11–25. [Russian].

New forms of stocks, 9 from Paradise VIII x Krasnyĭ Štandart [Red Banner] and 13–14 from Paradise VIII x Taežnoe [Taĭga], surpass rootstocks VIII and IX in hardiness. Variety 13–14 is tolerant of —14·8° C.

2326 **Jerseyred is name given superior Blake-bred apple.**
NJ Agric. 1954 : **36** : No. 5 : 8–9.

The Jerseyred apple.
Hort. News, NJ 1954 : **35** : p. 2830.

The late, fire-blight resistant variety Jerseyred (NJ1), which originated as a cross between Gallia Beauty, a red strain of Rome, and White Winter Pearmain, has recently been released by the New Jersey Agricultural Experiment Station. The large, red fruit is equal to Rome in its cooking and keeping qualities and superior as a dessert apple.

2327 Pavićević, B. M. & Stančević, A. S.
Osetljivost raznih sorti jabuka prema čadjavoj krastavosti. [**The susceptibility of some apple varieties to scab** (***V. inaequalis***)].
Arh. poljopr. Nauk. 1954 : **7** : No. 15 : 106–13.

Jonathan and Ontario are listed among varieties that showed resistance to scab in different districts of Serbia. Selection of resistant varieties is regarded as the most effective method of controlling the disease.

2328 Brock, R. D.
Hormone-induced pear-apple hybrids.
Heredity 1954 : **8** : 421–29.

Experiments at the John Innes Horticultural Institution, England, on the mode of action of β-naphthoxyacetic acid in inducing pear-apple hybridization indicated that success of the technique depended upon stimulation of pollen-tube growth and induction of parthenocarpy. Pear-apple fertilization occurred later than pear-pear fertilization. Pear-apple hybrids were only formed by varieties in which parthenocarpy was induced, the naturally parthenocarpic pear variety being the most favourable for hybridization. Apple-pear crosses failed completely. Pear-apple hybrids were obtained from Fertility (2*x*) x Cox (2*x*), Fertility x 16–36 AT (3*x*) and Comice x 16–36 AT. The growth of the hybrid seedlings was abnormal but 37% survived 4 months after germination. Apart from this abnormality, the seedlings showed characters intermediate between those of their parents.

2329 Williams, A. H.
Phenolic substances of pear-apple hybrids.
Nature, Lond. 1955 : **175** : p. 213.

Pear-apple hybrids were found to possess phenolic substances characteristic of both parents; the leaves contained phloridzin, arbutin, chlorogenic and isochlorogenic acids in quantity, and lesser amounts of phloretin, epicatechin and flavonol glycosides. In the two 3*n* hybrids studied, derived from 2*n* pear x 4*n* apple, the phenolics characteristic of the pear were present in lower amounts than in hybrids of which both parents were diploid or tetraploid.

2330 OGAKI, C. & SUDO, N.
(Experiments on the efficiency of oriental pear varieties as pollinators).
Kanagawa Noji Shikenjo Engeibun Kenkyu Hokoku/Bull. hort. Sect. Kanagawa agric. Exp. Sta. 1953 : No. 1 : 79–81. [Japanese].

The compatibility relations between nine Japanese varieties were investigated. Though some differences in seed setting were noted, most varieties were compatible and no evidence pointing to the existence of well-defined cross-incompatible groups was obtained.

2331 BANTA, E. S.
A chance seedling becomes a new Delicious pear.
Amer. Fruit Gr. 1954 : **74** : No. 11 : 14–15.

The outstanding characteristic of the pear Starking Delicious is its high degree of fireblight resistance. Its quality and yielding capacity are good. The variety originated from a chance seedling found on a farm in Ohio and possibly derived from Bartlett and an oriental type. Its propagation is being undertaken by Stark Brothers Nursery, Louisiana, Mo.

2332 SIEBS, E.
Untersuchungen über die Schorfresistenz von Birnen (II). Blattschorfresistenzprüfung an Sortennachkommenschaften. [**Investigations on the scab resistance of pears (II). Testing leaf scab resistance on varietal progenies**].
Phytopath. Z. 1954 : **22** : 437–48.

In this progress report details are given of the resistance to leaf scab (*Venturia pirini*) of seedling and clonal selections from resistant dessert and perry varieties in Germany.

It appeared that seedlings previously well tested and found resistant to leaf scab might still be infected by moderately virulent biotypes of the fungus.

Observations on the scab resistance of the fruits of the seedling clones will be needed before the value of the selected material can be finally determined.

2333 SIEBS, E.
Untersuchungen über die Schorfresistenz von Birnen (III). Stofflicher Hinweis auf die Grundlagen der Blattschorfresistenz. [**Investigations on scab resistance in pears (III). An indication of the chemical basis of resistance to leaf scab**].
Phytopath. Z. 1955 : **23** : 37–48.

Resistant varieties (cf. *PBA*, Vol. XXII, Abst. 1388 and Vol. XXV, Abst. 2332) were found to have smaller epidermal cells and leaves with a higher hydroquinone content than susceptible varieties. The arbutin content of the leaves may also be of significance, as this substance breaks down into hydroquinone and glucose under enzyme action, especially towards the end of the growing season. Laboratory tests showed hydroquinone to be highly toxic to the scab pathogen.

2334 BAHAREV, A. N.
(Mičurin's dream is realized).
Priroda (Nature), Leningrad 1955 : No. 1 : 49–54. [Russian].

Among the horticultural plants shown at the 1954 USSR Agricultural Exhibition are many new varieties, bred by disciples of Mičurin. They include apricots that are hardy under Mičurinsk conditions and produce high-quality fruits with thin husks, large kernels and oil contents between 70 and 75%, weighing 37–40 g.; hazels obtained by crossing wild hazel with the cultivated southern varieties, gooseberries with fruits twice as large as the standard varieties and showing resistance to *Sphaerotheca*; vines with green, pink and black grapes that ripen at Tomsk and are good in quality; and melons distinguished by high yields, earliness and pleasant flavour.

2335 HAMEL, A.
Le prunier dans le Québec (Canada). [**The plums of Quebec (Canada)**].
Rev. Oka 1955 : **29** : 1–13.

This popular account of the cultivation of the plum in Quebec includes a note on the morphology and systematics of the genus *Prunus* and some general information on the principal varieties of plum cultivated in the province.

2336 KOVALEV, N. V. & KALMYKOV, S. S.
(An artificial dwarf cherry x myrobalan hybrid).
Agrobiologija (Agrobiology) 1954 : No. 6 : 133–37. [Russian].

A single fertile plant was raised from the stones of a hybrid between *Prunus sogdiana* and a central Asiatic dwarf cherry. The fertility of the hybrid improved in the F_2, when a fruit set of 66·6% was obtained by pollination with the pollen of the domestic plum.

2337 MANN, A. J. & KEANE, F. W. L.
The Sue cherry.
Fruit Var. hort. Dig. 1954 : **9** : 36–37.

The white cherry Sue (Bing x Schmidt), developed at the Summerland Experimental Station, BC, is outstanding for its resistance to fruit cracking. It ripens about a week earlier than Napoleon.

2338 Lewis, D. & Crowe, L. K.
Structure of the incompatibility gene. IV. Types of mutations in *Prunus avium* L.
Heredity 1954 : **8** : 357–63.

Spontaneous and X-ray-induced mutations of the *S* complex in *P. avium* have been found to be of three types: (1) permanent loss of the component governing pollen activity, (2) revertible mutation affecting the component for pollen activity and (3) a permanent loss of the part determining stylar activity. Types (1) and (3) each cause self fertility. Seedlings which have received a revertible *S* mutation are self sterile. The types of *S* mutations found in *Oenothera* have also been detected in *Prunus*. It is assumed that type (3) mutations arose in the following manner. Simultaneous mutations affected the two components of the *S* complex; the pollen-controlling part then reverted to normal and the part conditioning stylar activity remained permanently altered. These investigations on the different types of mutations show that the two components of the *S* complex are capable of (1) mutating either independently or synchronously, and (2) reverting independently to the normal condition.

2339 De Mos, D.
Welke perzikrassen telen we in koude kassen? (**Which peach varieties do we grow in unheated greenhouses?**
Fruitteelt 1954 : 1082–84.

Information on varieties considered suitable for cultivation under glass in the Netherlands is given.

2340 Hough, L. F. & Bailey, C. H.
Peach breeding at Rutgers, 1954.
Hort. News, NJ 1954 : **35** : p. 2832.

Breeding for the following types of fruit is in progress: very early; early and midseason yellow freestones with good disease resistance; very late, firm, yellow freestones; large yellow nectarines; and large yellow clingstones for canning.

2341 Yamamoto, Y., Ogaki, C. & Tatsuno, Y.
(**Experiments and investigations on bacterial spot of the peach**).
Kanagawa Noji Shikenjo Engeibun Kenkyu Hokoku/Bull. hort. Sect. Kanagawa agric. Exp. Sta. 1953 : No. 1 : 57–67. [Japanese].

During the course of these investigations on infection of peaches by *Xanthomonas pruni*, the relative susceptibility of the varieties grown in Kanagawa was assessed. The most resistant varieties were Fuji and Shogyoku.

2342 Jordović, M.
Osetljivost plodova nekih sorata bresaka prema parazitu *Monilia* sp. (**Testing the susceptibility of peach varieties to the *Monilia* parasite**).
Arh. poljopr. Nauk. 1954 : **7** : No. 17 : 96–99.

In recent tests at Čačak, Jugoslavia, Red Bird, Elberta and J. H. Hale proved less susceptible to *Monilia* sp. than other varieties when the fruits were artificially infected with pure cultures of the pathogen.

2343 Paločaĭ, R.
(**A peach hybrid resistant to aphis**).
Priroda (Nature), Leningrad 1954 : No. 12 : 74–78. [Russian].

An aphid-resistant Rumanian variety with fruits weighing up to 312 g. is described. It was obtained from J. H. Hale x Bronze Elberta, both parental forms having been trained upon stocks of *Prunus amygdalus* var. *amara*.

2344 Philippe, J.
Les agrumes aux États-Unis. (**Citrus fruits in the United States**).
Bull. agric. Congo belge 1954 : **45** : 1619–88.

This study of the citrus-fruit industry in California, Florida and Texas includes notes on the principal varieties grown and on the main rootstocks employed and also gives a detailed account of breeding work at the Riverside Experiment Station, Calif.

2345 Chu, C.-C.
A review of literature on citrus nucellar embryony, and some new data on old and young lines of Valencia orange.
Taiwan Tahsueh Nunghsuehyuan Yenchiu Paokao/Mem. Coll. Agric. Taiwan Univ. 1953 : **3** : 20–33.

A comparative study, at the Citrus Experiment Station, Riverside, California, of eight nucellar lines derived from the Valencia orange is reported. The age of the lines showed a positive correlation with fruit yield and number of seeds per fruit and a negative correlation with fruit size.

2346 Fujita, K., Yukawa, I., Takeko, K. & Yagi, T.
(**Fine strains of the Unshu mandarin from the Kanagawa Prefecture**).
Kanagawa Nogyo Shikenjo Engeibungo Kenkyu Hokoku/Bull. hort. Br. Kanagawa agric. Exp. Sta. 1954 : No. 2 : 1–7. [Japanese].

Two local selections of the Unshu (=Satsuma) mandarin are described. Fujinaka is a midseason strain producing fruits of attractive appearance. Nishiyama is a later strain; it has a high acid and sugar content and stores well.

2347 DATTA, M.
Cytogenetical studies on two species of *Morus*.
Cytologia, Tokyo 1954 : **19** : 86–95.

Investigations were carried out on *M. laevigata* and several varieties of *M. indica* at the Bose Institute, Calcutta. *M. indica* had $2n = 28$ and contained four large heteropycnotic chromosomes, forming a quadrivalent, two bivalents or one trivalent and one univalent; reasons are given for not regarding these four as sex chromosomes. The remaining 24 smaller chromosomes formed at least 10 bivalents. The secondary association and multivalent formation observed suggest that *M. indica* is an allopolyploid, with $x = 7$. *M. laevigata* had $2n = 56$; its chromosomes did not show any marked range in size. Meiotic irregularities in *M. indica* resulted in a very high proportion of inviable seeds. *M. laevigata*, a balanced tetraploid, produced seed with 100% viability.

2348 SAMBAMURTY, K. & RAMALINGAM, V.
A note on hybridisation in the sapota (*Achras zapota* L.).
Indian J. Hort. 1954 : **11** : 57–60.

A technique of emasculation and hybridization is described, based upon observations on the floral biology of the species at Coimbatore, Madras. Seedlings from the cross between Cricket Ball and Oval are under observation.

2349 ISAEV, S. S.
(A valuable form of walnut).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1954 : No. 17 : p. 113. [Russian].

The new high-yielding variety Profsojuznyĭ [Trade Union], which was selected from local material in the Stavropolj province, is described briefly. The nuts, which are harvested in September, weigh 13–25 g. each and have shells 2 mm. thick. The kernels are large and sweet, and are easily detached from the shells.

2350 GAGNARD, J. M.
Recherches sur les caractères systématiques et sur les phénomènes de stérilité chez les variétés d'amandiers cultivées en Algérie. (**Research on the systematics of almond varieties grown in Algeria and on the phenomena of sterility**).
Ann. Inst. agric. Algér. 1954 : **8** : No. 2 : Pp. 163.

After presenting a brief history of almond cultivation in Europe and America, the author goes on to give descriptions of ten varieties at present under cultivation in Algeria, most of which have been introduced from Spain, Italy, France or California. Desmayo, Nec plus ultra, Avola, Fournat de Brézenaud, Marcona, Languedoc, Drake, Texas, Non Pareil [Without Equal] and the Californian variety IXL all proved self incompatible in recent experiments at the Maison-Carrée Agricultural Institute. Non Pareil and IXL were also cross incompatible but the other eight varieties proved intercompatible, although some crosses gave a better fruit set than others. Atmospheric humidity at the time of pollination had a more detrimental effect on some crosses than on others. Self and cross incompatibility is attributed to the action of a series of multiple alleles which inhibit the growth of the pollen tube in the style.

2351 GOLOSKOKOV, V. P.
(*Amygdalus ulmifolia* from the Džungarskiĭ Ala-Tau).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1954 : No. 17 : 74–76. [Russian].

An almond discovered in the Džungarskiĭ Ala-Tau at 1400 m. above sea level is described; it may prove useful in breeding almonds and allied species for improved winter hardiness.

2352 JOHN, C. M., VENKATANARAYANA, G. & SESHADRI, C. R.
Varieties and forms of groundnut (*Arachis hypogaea* Linn.). Their classification and economic characters.
Indian J. agric. Sci. 1954 : **24** : 159–93.

In this study, based on material available in the collection at Tindivanam, Madras, the taxonomy of groundnut species and varieties is discussed and a classificatory scheme employing both morphological and economically important characters is presented. All cultivated forms are included under *A. hypogaea* var. *oleifera*. Of the 85 varieties and forms contained in the collection, only 40 are recognized as distinct. Their qualitative and quantitative characters are tabulated and a key to their identification is included.

2353 NARASIMHA RAO, V. L. & GIDEON, C. A.
Internodal length as an index of measurement for drought resistance in groundnut.
Curr. Sci. 1954 : **23** : p. 411.

In seven bunch varieties tested in Hyderabad under conditions of drought, a significant positive correlation was found between the internodal length and number of wilted plants per population. The most drought-resistant variety was Kopargaon-1.

2354 KATAYAMA, Y. & NAGATOMO, T.
(Investigations on recently developed crops. II. Groundnut).
Miyazaki Daigaku Jiho (Shizenkagaku)/Bull. Miyazaki Univ. (Nat. Sci.) 1953 : No. 4 : 89–101. [Japanese].

Extensive data on the habit, biometrical characteristics of the stems, leaves, pods and seeds, pigmentation of the leaves and flowers, disease resistance, and fresh and dry weight of the vegetative parts, fruits and seeds are provided for a large number of varieties under trial in Japan.

2355 FREEMAN, B. & CUTTER, V. M. (Jun.)
Nuclear aberrations in the syncytial endosperm of *Cocos nucifera*.
J. Elisha Mitchell sci. Soc. 1954 : **70** : p. 128. (Abst.).

Amitotic division figures have been observed in the free nuclei and endosperm vesicles of the syncytium.

2356 CUTTER, V. M. (Jun.), WILSON, K. S. & FREEMAN, B.
Nuclear behavior and cell formation in the developing endosperm of *Cocos nucifera*.
Amer. J. Bot. 1955 : **42** : 109–15.

Some additional data on the ontogeny of the syncytial endosperm of the coconut are given (cf. *PBA*, Vol. XXIV, Abst. 3335). The authors are unable to confirm the occurrence of mitosis in the free syncytial nuclei reported by Dutt (cf. *PBA*, Vol. XXIII, Abst. 2363) but amitosis appears to be frequent.

2357 FRANCESCONI, F.
Sul comportamento all' essiccazione delle foglie di razze diverse d'olivo. (**On the behaviour of the leaves of different olive varieties on drying**).
Ann. Sper. agr. 1955 : **9** : 209–220.

The rate of water loss in detached leaves of olive trees growing under similar conditions differed according to the variety. It was found that the varieties with the highest sugar content in the leaves had the lowest rate of water loss and it is suggested that this might provide an indirect way of measuring sugar content in selecting cold-resistant varieties.

2358 HOROVITZ, S.
Determinación del sexo en *Carica papaya* L. Estructura hipotética de los cromosomas sexuales. (**Sex determination in *C. papaya* L. Hypothetical structure of the sex chromosomes**).
Agron. trop., Venezuela 1954 : **3** : 229–49.

The hypotheses of Hofmeyr and Storey are examined critically and it is pointed out that all the near relations of the species *C. papaya* are diecious, and that the andromonecious forms of *C. papaya* contain groups of morphological features, some characteristic of the pistillate forms and others characteristic of the staminate; this, together with the extreme lability of the sexual characteristics in the andromonecious forms, suggests that these result from a duplication of a small segment in the sex chromosome. The various types can thus be explained on the basis of a single gene pair *Ff* for sex expression: *ff* genotypes are all pistillate, *Ff* are staminate, *Fff* is the C type andromonecious, with staminate periods, and *Ffff* is the B type andromonecious with continuous flowering. Various types obtained by Hofmeyr in artificial tetraploids are explained on the same basis. Neither of the andromonecious types occurring in nature has a selective advantage and both have been preserved by human selection.

2359 DUTTA, S.
Jujubes of Assam.
Indian J. Hort. 1954 : **11** : 53–56.

Five of the six varieties described are tentatively assigned to *Zizyphus mauritiana*, the remaining one being classified as *Z. jujuba*.

2360 DENISEN, E. L.
Breeding small fruits for Iowa.
Iowa St. hort. Soc. 1953 (1954) : **88** : 56–61.

The techniques employed for crossing, seed germination, transplanting and field cultivation in strawberry and raspberry breeding at the Iowa Agricultural Experiment Station are outlined. The following varieties have proved to be valuable parents, giving rise to large numbers of promising selections: the strawberries Streamliner, Shasta, Arrowhead and Iowa 1/37013; the black raspberries Bristol and Morrison; and the red raspberries Latham, Washington and NC206. Several introduced species are being used in raspberry breeding. Future activities mentioned include the study of the possibility of using inbred lines of strawberry to produce vigorous hybrids.

2361 LANTZ, H. L. & DENISEN, E. L.
Black Hawk. A new raspberry for the midwest.
Iowa Fm. Sci. 1954 : **9** : No. 6 : 3–5.

Developed at the Iowa Agricultural Experiment Station from a cross between the varieties Quillen and Black Pearl of *Rubus occidentalis*, the new variety Black Hawk bears high yields of large, firm and fleshy fruits suitable for freezing and other purposes. It has good winter hardiness and some resistance to anthracnose.

2362 LEDIN, R. B.
A tropical black raspberry for South Florida.
Circ. Fla. agric. Exp. Sta. 1953 : No. S–56 : Pp. 12.

An introduction of *Rubus albescens* has proved to be well adapted to southern Florida, producing good fruit over a period of 4–5 months. The species may be valuable in breeding for resistance to insects and diseases and for varieties not requiring a prolonged chilling period to induce flowering. This species is now being used in breeding at two stations of the University of Florida.

2363 WOOD, C. A.
Fruit variety trials. II. A trial of raspberry varieties and seedlings at Kirriemuir, Angus.
Scot. Agric. 1954–55 : **34** : 161–65.

Details of yield, growth habit, frost resistance, date of maturity, fruit quality and behaviour on processing are presented for five years' trials. Of the early varieties, Malling Exploit was equal in vigour to Malling Promise and superior in yield and fruit quality, while Lloyd George (New Zealand stock) had the firmest fruit but the lowest frost resistance. The late mid-season variety Seedling V suffered least from *Botrytis* attack.

2364 HAMEL, J. -L.
Contribution à l'étude cyto-taxinomique des Saxifragacées. (**Contribution to the cytotaxonomic study of the Saxifragaceae**).
Rev. Cytol., Paris 1953 : **14** : 113–308.

A detailed account of the chromosome numbers, chromosome morphology and structure of the interphase nuclei of 118 species pertaining to 31 genera of the Saxifragaceae is given. The family is characterized by a large number of basic chromosome numbers, viz. $x = 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19$ and 21. Cytological evidence on the systematic affinities between and within the genera is frequently at variance with the standard taxonomic conclusions. The genus *Ribes* is a comparatively uniform and well-defined taxon in which $2n = 16$ in most cases, and the interphase nuclei are of the pileate type. The author was unable to confirm or deny Hutchinson's division of the Saxifragaceae sens. lat. into an herbaceous and a woody series.

2365 Resultaten rassenproef met bessen. (**Results of variety trials of currants**).
Fruitteelt 1955 : **45** : p. 268.

The results of trials of red currants at Zeerijp, Netherlands, during 1947–54 are presented, together with information on growth habit and fruit quality. Duitse Zure [German sour] gave the highest yields of varieties suitable for processing and Jonkheer van Tets [Squire of Tets] was the most productive among the dessert varieties.

2366 RITCHIE, J. C.
A natural hybrid in *Vaccinium*. I. The structure, performance and chorology of the cross *Vaccinium intermedium* Ruthe.
New Phytol. 1955 : **54** : 49–67.

V. intermedium, the putative hybrid of *V. myrtillus* x *V. vitis-idaea*, is described. Observations on the hybrid form in different localities in England provided evidence that it possesses hybrid vigour but is low in pollen fertility. Data on the distribution of the above three forms suggest that the parent species are isolated by the interaction of ecological, phenological and biological factors; disturbance in the habitat due to man leads to a breakdown of this isolation.

2367 BLAKE, R. C.
Strawberry progeny testing and evaluation of parents for breeding.
Diss. Abstr. 1954 : **14** : Publ. No. 9611 : p. 1892.

Nine inbred clones were selfed and also intercrossed in all possible combinations. The following characters were studied: time of flowering, time and rate of ripening, productiveness, and the attractiveness, size, colour and flavour of the fruit. As a rule, the parents were placed in the same order when evaluated according to their means for general combining ability, specific combining ability and for the performance of their selfed progenies with regard to the above characters. Since the means for the selfed progenies showed the greatest range, it was concluded that tests of selfed progenies provide the most efficient means of assessing breeding potentialities. Experiments were also carried out on single, three-way and double crosses of inbreds. Significant differences between the the crosses were obtained for all the characters studied, many of these differences being attributable to certain parents. Differences were frequently found between sister selections in their ability to transmit particular characters. No reciprocal differences were detected in any of the crosses.

2368 Staudt, G.
Die Vererbung des Geschlechts bei der tetraploiden, diözischen *Fragaria orientalis* LOS. (**The inheritance of sex in the tetraploid diecious species *F. orientalis* LOS**).
Ber. dtsch. bot. Ges. 1955 : **67** : 384–87.

At the Max Planck Institute for Research on the History of Crop Plants, Berlin-Dahlem, specimens of *F. orientalis* obtained from Manchuria were intercrossed to obtain information on the inheritance of sex in this species, plants of which usually bear either purely male or purely female flowers. In all but one of the twelve crosses effected, the sex ratio in the F_1 was approximately 6 ♀: 4 ♂; in addition, some 5% of the F_1 plants proved to be hermaphrodites.

2369 Aoba, T. & Oike, T.
(**On the differentiation and development of the flower buds of the strawberry in the zone of the Tohoku district subject to accumulation of snow**).
Yamagata Daigaku Kiyo (Nogaku)/Bull. Yamagata Univ. (Agric. Sci.) 1954 : **1** : 307–14. [Japanese].

Data are provided on the times of flower bud initiation, flowering and fruit maturation of a series of Japanese and American varieties.

2370 Darrow, G. M. & Borthwick, H. A.
Fasciation in the strawberry. Inheritance and the relationship of photoperiodism.
J. Hered. 1954 : **45** : 299–304.

Fasciation sometimes causes serious losses to growers in the middle and southern Atlantic States of the USA. A tendency to develop fasciation is inherited in certain lines, Fairfax and some varieties partly derived from Fairfax, such as Eleanor Roosevelt, Sparkle and Red Star, being particularly susceptible. The amount of fasciation in susceptible varieties was increased by short photoperiods. General observations suggest that growth conditions and age of the plant also affect the degree of fasciation.

2371 Kronenburg, H. G.
Welke aardbeirassen? (**Which strawberry varieties?**)
Fruitteelt 1954 : 1074–77.

Brief data on the pedigree, growth habit, degree of sensitivity to virus diseases, size and quality of the fruit and suitability for canning and freezing purposes are presented for 16 varieties, including some of German and American provenance, tested at Wageningen, Netherlands, in 1952–54.

2372 Darrow, G. M., Scott, D. H. & Goheen, A. C.
Relative resistance of strawberry varieties to powdery mildew at Beltsville, Maryland, 1954.
Plant Dis. Reptr. 1954 : **38** : 864–66. (Mimeographed).

Of 41 strawberry varieties tested under greenhouse conditions favourable to infection by *Sphaerotheca maculata*, 11 showed no infection and eight were very resistant. Under field conditions slightly less injury was observed than in the greenhouse.

2373 Posnette, A. F. & Cropley, R.
Strawberry yellows in the variety Auchincruive Climax.
J. hort. Sci. 1955 : **30** : 56–61.

The abnormalities known as transient yellows and streak, affecting the above variety, are regarded as heritable, probably being controlled by plasmagenes. The development of the two abnormalities in four strains of the variety is described.

2374 Dieguez Castro, J.
La sigatoka en Tingo María. (**Panama disease at Tingo María**).
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1953 : **2** : No. 2 : 14–17.

Reference is made to the occurrence in Peru of the Panama disease of bananas caused by *Mycosphaerella musicola*. Tests are being made with the resistant variety IC2 from the Imperial College of Tropical Agriculture, Trinidad (cf. *PBA*, Vol. XXII, Abst. 2246), attention being given to the possible existence of different physiological races of the fungus.

2375 Hernández, A. R. de
Relationship between chromosome number and stomata size in certain pineapple varieties.
J. Agric. Univ. PR 1954 : **38** : 199–204.

In a study of the diploid varieties Red Spanish, Eleuthera, Hondureña, Pan de Azúcar, Amarelo Boituva, Natal, Smooth Cayenne, Golden Abachi, Inerme Paulista and Instituto Mayagüez and the triploid variety Cabezona, a highly significant difference in stomatal size was found between the $2n$ and $3n$ forms, the average size in the diploid varieties being 23·46 x 23·16 microns and in the triploid 27·88 x 26·84 microns.

2376 GOTTSCHALK, W.
Das Auftreten kettenförmiger Chromosomenverbände in der Meiosis verschiedener *Physalis*-Arten. (**The occurrence of chromosome chain formations in the meiosis of different *Physalis* species**).
Z. indukt. Abstamm.- u. VererbLehre 1954 : **86** : 157–72.

Experiments conducted at the Department of Plant Cultivation and Breeding Biology of the Max Planck Institute for Breeding Research, Neuhof, Germany, demonstrated that meiosis was regular in the pollen mother cells of *Ph. angulata*, *Ph. floridana*, *Ph. lancifolia*, *Ph. ixocarpa*, *Ph. peruviana*, *Ph. philadelphica* and *Ph. pubescens*. During diakinesis in *Ph. alkekengi* and *Ph. franchetii*, translocation had led to the appearance of chains composed of up to eight segments, chains of three or four segments being the most common. A large number of univalents were observed.

2377 FRANCESCONI, F.
Un ibrido produttore diretto in Umbria. (**A direct-producer hybrid in Umbria**).
Ann. Sper. agr. 1955 : **9** : 77–83.

A grape hybrid of unknown origin, said to be of Rupestris du Lot x Malbek, received in Italy from Montpellier in 1909, has been named Ibrido speciale francese [Special French Hybrid]. It is completely resistant to phylloxera, mildew and downy mildew and yields well in a variety of soils, even under conditions of high humidity, producing a wine of moderately good quality. There are three subtypes differing in certain morphological details.

2378 COSMO, I. & POLSINELLI, M.
"Riesling italico." (**Italian Riesling**).
Ann. Sper. agr. 1955 : **9** : No. 1 : Suppl. xxxiii–xliii.

The history of this popular Italian vine, thought to be identical with the Austrian Welschriesling, is outlined and its characteristics are described and illustrated.

2379 COSMO, I. & POLSINELLI, M.
"Raboso Piave." (**Raboso Piave**).
Ann. Sper. agr. 1955 : **9** : No. 1 : Suppl. cvii–cxx.

The origin of the Raboso Piave vine, popular in northern Italy, is discussed, a number of synonyms are indicated and the characteristics of the variety are described and illustrated.

2380 AĬVAZJAN, P. K. & KOSTJUK, A. N.
(**Inheritance of characters in the first generation of intraspecific crosses of vines**).
Agrobiologija (Agrobiology) 1954 : No. 6 : 51–56. [Russian].

Considerable variability was observed at Odessa in the F_1 of intervarietal crosses between European vines. The morphological and biological characters of old-established varieties that had become adapted to local soil and climatic conditions were usually but not always dominant over those of new varieties. A number of segregates had characters intermediate between those of the two parents, but some new forms occurred. For example, in some cases hybrids between varieties with black grapes bore white grapes. Crosses between varieties with perfect flowers normally transmitted this character to their offspring, although some hybrids resembling wild species and bearing staminate flowers were found. Several hybrids distinguished by their perfect flowers, vigorous growth and high yields are described. They are mainly varieties with black grapes and coloured juice and are suitable for making wine. The hybrid Čuaš x Hamburg Muscat produced large bunches of white dessert grapes with a muscat flavour. Another early-maturing variety bearing white grapes is suitable for making muscat wines.

2381 KOSTJUK, A. N.
(**Utilization of root mentors in vine breeding**).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 2 : 75–76. [Russian].

Hybrids recently obtained at Odessa from interspecific and intraspecific crosses are described briefly. Some of them, for example Rkaciteli x Sereksija, are resistant to phylloxera. When trained upon Riparia x Rupestris 101–14 or Riparia x Rupestris 3309, many of the hybrids matured earlier and their resistance to frost and phylloxera improved. Grafting also resulted in higher yields, increased vigour and larger grapes, but did not prejudice the colour and shape of the berries or the aroma, flavour and colour of the juice.

2382 Patel, G. I. & Olmo, H. P.
Cytogenetics of *Vitis*: I. The hybrid *V. vinifera* x *V. rotundifolia*.
Amer. J. Bot. 1955 : **42** : 141–59.

Vigorous 39-chromosome hybrids have been obtained by pollinating *V. vinifera* varieties ($2n = 38$) with *V. rotundifolia* pollen ($2n = 40$). The reciprocal combination failed. In most respects, the morphological characteristics of *V. rotundifolia* proved dominant. The hybrids were completely sterile. The chromosome configurations were $0–4_{IV} + 6–18_{II} + 3–15_{I}$.
V. vinifera, *V. labrusca* and *V. lincecumii* are believed to have the same genomic constitution on which, however, internal structural differences are superposed. *V. rotundifolia* appears to be cytotaxonomically remote from these three species. The genomic formulae $13R^vR^v + 6AA = 19_{II}$, $13R^rR^r + 7BB = 20_{II}$ and $13R^rR^v + 6A + 7B = 13_{II} + 13_{I}$ are proposed for *V. vinifera*, *V. rotundifolia* and the hybrid, respectively.

2383 Kuzjmin, A. J.
(New winter-hardy varieties of vines).
Priroda (Nature), Leningrad 1955 : No. **1** : 106–09. [Russian].

By sowing hybrid seed later than is normal at Mičurinsk, new varieties with growth periods shorter than Sejanec Malengra [Malingre Seedling] have been obtained. Their growth periods varied between 83 and 117 days and they produced ripe grapes when grown in Moscow province. Tambovskiĭ Rozovyĭ [Pink Tambov] from Sejanec Malengra x Chasselas Seedling and Sejanec 16 [Seedling 16] from Russkiĭ Konkord [Russian Concord] x Early Malingre had the best quality.

2384 Tkačenko, G. V.
(Cleistogamy and its effect upon formation of grapes on the vine).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1955: No. 1 : 67–68. [Russian].

Data are presented on the effects of cleistogamy, as expressed by percentages of aborted blooms and numbers and weights of the grapes formed, in some varieties cultivated in Transcarpathia.

2385 Baptista, A. & Suspiro, E.
O "Corriola" e outros porta-enxertos para as regiões dos Vinhos Verdes e de Madeira. **(Corriola and other vine rootstocks for the region of the Vinhos Verdes and for Madeira).**
Estud. Inform. téc. Direcç. Serv. agríc., Lisboa 1954 : No. 40 : Pp. 55.

Corriola is a vine of unknown origin much used in Portugal as a rootstock. Its botanical characteristics, which are described, lead the authors to suppose that it is a *Vitis vinifera* x *V. berlandieri* hybrid. Experiments are reported in which the value of Corriola as a rootstock is confirmed.

2386 Meljnik, D. G.
(An experiment in growing vines).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 12 : 64–65. [Russian].

In trials conducted in the Mari ASSR, Malingre Seedling, Chasselas Seedling and Černyĭ Sladkiĭ [Sweet Black] produced the highest yields, but proved inferior to Severnyĭ 7 [Northern 7] and Buĭtur in winter hardiness.

FORESTRY

Report on Forest Research of the Forestry Commission, for the year ending March, 1953 (1954) : Pp. 122.

2387 *Wood, R. F. & Edwards, M. V. Silvicultural investigations in the forest.* (*pp. 32–41*).

A trial of six *Eucalyptus* species has been established at St. Clements Forest, Cornwall.
Provenance studies of Japanese larches from different areas in Japan, of beeches of English and foreign origin and of Scots pine are in progress. A progeny trial of selected English beeches has also been undertaken.

2388 *Peace, T. R. & Jobling, J. Varietal trials and other work on poplars.* (*pp. 53–55*).

Eight major and 11 minor varietal trials are in progress. At Yardley, Northamptonshire, the greatest average height and girth were attained by *Populus carrieri*, *P. rubra*, *P. laevigiata* and *P. berolinensis*. Clones of *P. marilandica*, *P. robusta*, *P. regenerata*, *P. canescens*, *P. gelrica*, *P. charkowiensis* and the Italian selections 65 and 214 are doing well.
Additions have been made to the varietal collection.

2389 *Matthews, J. D. Forest genetics.* (*pp. 56–60*).

The selection and propagation of plus trees of the main forest species for use in breeding have been continued.
Beech. In trials of beech, the progeny from English plus stands and from open-pollinated plus trees are being compared with progeny from European beeches. A seed plantation has been planted at Rendlesham, Suffolk.
Larch. A seed plantation for the production of F_1 hybrid larch is being established at Newton Nursery, Moray.

Sitka spruce. Progeny trials of plus trees are in progress.

2390 *Peace, T. R. The control and avoidance of forest tree diseases.* (*pp. 62–70*).

Most of the blight-resistant Asiatic chestnuts being tested lack hardiness, but *Castanea henryi* is doing well in Edinburgh.

Poplar clones are being tested for resistance to bacterial canker.

2391 *Laing, E. V. Studies of variation in conifers.* (*pp. 121–22*).

The identification of Japanese, European and hybrid larch seedlings is made uncertain by the considerable variation in cotyledon anatomy of European larch, but some characteristic differences between the two species are noted.

Several morphological strains of Douglas fir have been distinguished.

Differences between two types of *Pinus contorta* are presented in table form.

Berichte über die 4. Tagung der Arbeitsgemeinschaft für Forstgenetik und Forstpflanzenzüchtung. (**Reports on the Fourth Meeting of the Association for Forest Genetics and Forest Tree Breeding**).

Z. Forstgen. Forstpflanzenz. 1954 : **3** : 130–42.

The 1954 meeting of the above society (cf. *PBA*, Vol. XXII, Abst. 1460) was held at Schmalenbeck, Germany, on 15–17 July and at Ekebo, Sweden, on 19–20 July. The following abstracts of interest to breeders are published:—

2392 *Barner, J. Eine Selektionsmöglichkeit verschieden lichtreagibler Pappelklone.* (*The possibility of selecting poplar clones that vary in their reaction to light*). (*p. 135*).

Experiments at Freiburg, Black Forest, have shown differences between clones in the extent to which they become etiolated or deformed as the result of overshadowing by neighbouring trees. Selection for resistance to etiolation would be of considerable value in replanting clearings in which young trees are initially deprived of direct light by the mature poplars surrounding them.

2393 *Heitmüller, H.-H. Vegetative Vermehrung unter Verwendung von Wuchsstoffen bei* Populus canescens *Smith und* Populus tremula *L.* (*Vegetative propagation of* P. canescens *Smith and* P. tremula *L. by the use of growth substances*). (*pp. 135–36*).

The importance of the vegetative propagation of plus trees is discussed. Experiments at Wächtersbach have shown that root cuttings obtained from young trees give better results than those from fully-grown trees. Clonal differences in ability to strike root were also observed.

2394 *Illies, Z. M. Weitere Erfahrungen mit colchicinierten Lärchen.* (*Further experiences in treating larch with colchicine*). (*pp. 136–37*).

Treatment of germinating seeds with a 0·1–0·5% warm colchicine solution at Schmalenbeck resulted in 2·8% mixoploid plants, compared with 0·09% mixoploid plants obtained in previous experiments, in which a different method was employed (cf. *PBA*, Vol. XXII, Abst. 1475). Attempts to induce polyploidy by treating the growing shoots of young trees with 0·5% colchicine solution failed, as the unaffected diploid cells quickly overgrew cells in which growth had been arrested by the effects of the treatment.

2395 *Krahl-Urban, J. Einige neue Ergebnisse von Rassenstudien bei der Rotbuche.* (*Some new results of race studies on the beech*). (*pp. 137–38*).

The morphological characters of the stem and branches, growth habit, and the texture and colour of the bark of trees from the Bavarian and Bohemian Forests, the East Bavarian Alps and the Karawanken Mountains were compared to obtain information on selective processes in these three areas. Specimens obtained from mountainous regions had straighter stems, thinner branches and denser crowns than beeches from low-lying districts; this is attributed to the selective effect of heavy snow. In addition, the bark of trees from high altitudes was smoother in texture and lighter in colour, presumably because trees with such bark are able to withstand intense sunlight.

2396 *Langner, W. Dominante Vererbung von Wüchsigkeit und Wuchsform bei Fichte* (Picea abies). [*Dominant inheritance of growth vigour and growth shape in spruce* (P. abies)]. (*p. 138*).

The progeny of crosses between a ♀ tree of Flensburg origin and a ♂ tree from the Mittelgebirge, central Germany, resembled the male parent in vigour, growth habit and colour of the needles. Spruce trees from the Flensburg area are distinguished from those from the Mittelgebirge by their slower rate of growth and the greyish colour of their needles.

2397 *Langner, W. Kreuzungsversuch zwischen nordischer und Schwarzwälder Fichte.* (*Hybridization experiment with northern spruce and spruce from the Black Forest*). (*p. 138*).

The growth rate of hybrids from crosses between spruce trees from Sundmo, Sweden, and the Black Forest was intermediate between those of their parents.

2398 *Langner, W. Blütenbildung an Zwergfichten. (Flower formation in dwarf spruce). (p. 138).*

At the Tannenhöft tree nursery 40-year old specimens of *Picea abies* var. *compacta pyramidalis* and *P. abies* var. *pygmaea* flowered for the first time. Crosses between these two forms and with normal *P. abies* were effected.

2399 *Langner, W. Rückmutation bei Zwergfichte. (Reverse mutation in dwarf spruce). (pp. 138–39)* .

At Tannenhöft, some dwarf trees of *P. abies* var. *humilis* have developed branches of a normal size. The phenomenon is attributed to reverse mutation.

2400 *Langner, W. Kreuzungsversuche mit Hilfe einer freistehenden Feuerwehrleiter. (Hybridization experiments with the aid of a fire-engine ladder). (p. 139).*

By using a fire-engine ladder it was found possible at Schmalenbeck to conduct artificial pollinations without damaging the bark or branches.

2401 *Rohmeder, E. Umwelt und Erbanlagen bei der Fichtensamenausbeute. (Environment and hereditary constitution in the yield of spruce seed). (p. 139).*

A summary of the contents of this article is to be found in Abst. 2428.

2402 *Schmidt, H. Kartierung bodenständiger Bestände. (Mapping native stands). (p. 139).*

A summary of the contents of this article is to be found in Abst. 2429.

2403 *Schönbach, H. Celluloseuntersuchungen an Einzelstämmen und Klonen der Pappel. (Investigations of cellulose in single trees and clones of poplar). (pp. 139–40).*

Methods of determining the cellulose content of poplar are discussed. At Graupa, interspecific crosses have been effected with a view to improving cellulose content.

2404 *Schröck, O. Der individuelle Wachstumsgang und seine Bedeutung für die Methodik der Forstpflanzenzüchtung. (Individual rate of growth and its significance for systematic forest-tree breeding). (pp. 140–41).*

At Waldsieversdorf, measurements of the rate of root development were found to be more reliable criteria in assessing the future vigour of one-year-old pines and spruces than were measurements of the growth rate of the stem.

2405 *Seitz, F. W. Über den Selbstungs- und Kreuzungserfolg bei Verwendung des Pollens der zwittrigen Graupappel von Dillingen. (On the result of selfing and crossing using the pollen of the hermaphrodite grey poplar from Dillingen). (p. 141).*

A number of triploid seedlings (cf. *PBA*, Vol. XXIV, Abst. 2468) were discovered among the progeny of crosses of the Dillingen hermaphrodite clone with *P. tremula*, *P. alba* and *P. canescens*.

2406 *Stern, K. Die Teilstückgrösse im Sortenversuch. (Plot size in variety trials). (p. 141).*

Factors to be considered when determining plot size in forest-tree progeny trials are discussed.

2407 *Wettstein-Westersheim, W. Einfluss der Tageslänge auf das Wachstum der Kiefer* (Pinus silvestris). [*Influence of day length on the growth of pine trees* (P. silvestris)]. *(p. 142).*

Experiments at Mariabrunn showed that reaction to day length varied according to the district from which the specimens under investigation were obtained and was apparently the result of natural selection.

2408 SCHMIDT, W.
Die Ausarbeitung forstlicher Züchtungsverfahren. (**The elaboration of forestry breeding methods**).
Z. Weltfw. 1953 : **16** : 168–76.

This general survey of forest-tree breeding in Germany and Sweden is devoted mainly to an account of progress achieved in recent years by the selection of plus trees, interspecific and intraspecific hybridization, the exploitation of hybrid vigour, the induction of mutations, the polycross method and recombination. The technique of carrying out artificial crosses is explained in some detail and genetical terms employed in forest-tree breeding are defined.

2409 IRGENS-MOLLER, H.
Forest-tree genetics research: *Quercus* L.
Econ. Bot. 1955 : **9** : 53–71.

The author surveys the literature on *Quercus* with reference to the following aspects: classification and nomenclature; utilization; natural hybridization and speciation; selection from wild stock; controlled hybridization; vegetative propagation; cytology; studies of inheritance; and racial differentiation.

2410 NATIVIDADE, J. V.
La sélection et l'amélioration génétique du chêne-liège (*Quercus suber*) au Portugal. [**Selection and genetic improvement of the cork oak (*Q. suber*) in Portugal**].
Rev. for. Fr. 1954 : **6** : 346–54.

In view of the importance of the cork oak to the Portuguese economy, considerable emphasis is being placed at the present time on the selection and clonal propagation of plus trees. Owing to the heterozygous nature of the species and the diversity of types found throughout the country, considerable progress has been achieved in improving the quality of the cork and increasing the rate of growth of the tree. Increased yields of acorns, which are used for fodder, a reduction in the incidence of alternate bearing and improved resistance to diseases and insect pests have also been obtained by straightforward selection. Intraspecific and interspecific crosses are now to be effected to explore the possibilities of exploiting hybrid vigour and experiments aimed at inducing favourable mutations will be carried out.

2411 DANILOV, M. D.
(**Early and late-flowering forms of aspen**).
Bjull. mosk. Obšč. Ispyt. Prirod. (Bull. Moscow Soc. Nat.) 1954 : No. **5** : 23–39. [Russian].

Two biotypes of *Populus tremula* found in the Mari ASSR are described. The late-flowering form, distinguishable from the other by its lighter bark and larger leaves, is economically the more valuable on account of its resistance to frost, drought and heart rot. Trees that are 50 years old yield considerably more timber than early-flowering forms of the same age.

2412 KONOVALOV, N. A.
(**Research on breeding poplars**).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 773–75. [Russian].

New hybrids developed in recent years at Kiev are described. They include *Populus tremula* x *P. alba*, *P. angulata* x *P. nigra* and *P. nigra* x *P. balsamifera* and are distinguished by their rapid growth, hardiness and resistance to drought.

2413 RICHENS, R. H.
Studies on *Ulmus*. I. The range of variation of East Anglian elms.
Watsonia 1955 : **3** : 138–53.

A taxonomic study of East Anglian elms is presented, based on a systematic sampling procedure covering an area 100 km. square. The degree of taxonomic affinity between the samples collected is worked out by a statistical analysis of the significance of the differences of five selected leaf characteristics; the results are represented graphically in the form of a net work of bars connecting closely related samples.

Eleven taxonomic groups are distinguished within the genus. The species *U. glabra*, *U. carpinifolia* sens. lat. and *U. procera* are regarded as fairly satisfactorily distinguishable, but the groups recognized both cut across and transcend the microspecies *U. carpinifolia* Melville, *U. coritana* and *U. diversifolia*. A proposal to replace Latin epithets for the subordinate taxa of *U. carpinifolia* sens. lat. by numerical designations is put forward.

The history of elms in England since the Neolithic era is reviewed in the light of phytogeographical, documentary and philological evidence, and the role of the elm as a forage tree in ancient agricultural practice is discussed.

2414 MAŃKA, K.
O przebiegu holenderskiej choroby wiazów (*Ceratostomella ulmi* (Schw.) Buisman) na terenie miasta Poznania. [**On the course of Dutch elm disease (*C. ulmi* (Schw.) Buisman) in the town of Poznań**).
Acta Soc. Bot. Polon. 1953 : **22** : 355–78.

In this study of the elms of Poznań during 1946–49, the number of trees of the species *Ulmus campestris* L., *U. effusa* Willd. and *U. montana* Smith was 1513, 525 and 44, respectively. The trees of the three species were classified into three groups according to height and also divided into three age groups; the oldest group consisted mainly of *U. effusa* and the two younger groups mainly of *U. campestris*. A separate group of 201 pollarded elms of the species *U. campestris* was also studied.

Of the 2082 elms studied 511 died. Apart from the pollarded group of *U. campestris*, which exhibited a negligible degree of infection, the mortality was highest in *U. montana*, lower in *U. campestris* and lowest in *U. effusa*.

In 1946, the trees of the species *U. effusa* were for the most part strongly attacked in one district, but the mortality was relatively low, and in 1947–49 marked recession of the progress of the disease was noted in many of these trees.

2415 **Progress report of the Dominion Forest Nursery Stations, Indian Head, Sask. and Sutherland, Sask., 1947-1952** (1954) : Pp. 40.

The following breeding work is among the activities reported:—

***Caragana arborescens*.** Study of the fertility of seed-tree selections and of the effect of the characteristics of the seed trees upon the vigour of their progenies indicated that seed trees should be selected not only for their apparent vigour but also for low self sterility combined with a high degree of fertility in open pollination. The following method is suggested: (1) establishment of clones of cross-compatible selections in isolated polycross nurseries, (2) evaluation of the polycross progenies to determine the combining ability of the selections, and (3) planting of superior selections in pairs in natural crossing blocks for seed production.

***Pinus sylvestris*.** Selection of superior seed trees of six geographical races has been undertaken.

2416 CLIFFORD, H. T. & BINET, F. E.
A quantitative study of a presumed hybrid swarm between *Eucalyptus elaeophora* and *E. goniocalyx*.
Aust. J. Bot. 1954 : **2** : 325–36.

"From measurements of fruit lengths, fruit weights, and lengths of fruiting umbels of trees from the species *Eucalyptus elaeophora* and *E. goniocalyx* and their presumed hybrid swarm, a formula is calculated for taxonomic classification using statistical discriminant theory. The rates of misclassification expected with the use of this formula are estimated. A simple geometrical model of the relationship of the species and the hybrid is investigated." [Authors' summary]

2417 JACENKO-HMELEVSKIĬ, A. A.
(The "hornbeam-hazel tree of Diližan" and the problem of "interspecific conversions").
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 882–89. [Russian].

An account of investigations carried out at Diližan on the hornbeam bearing a hazel branch (cf. *PBA*, Vol. XXIII, Abst. 1501) is given. The writer, a member of the commission appointed to study this phenomenon, rejects Esajan's hypothesis of interspecific conversion (cf. *PBA*, Vol. XXIV, Abst. 3387) and states that the tree is an example of natural grafting.

2418 MCVEAN, D. N.
The ecology of *Alnus glutinosa* (L.).
Abstr. Diss. Univ. Camb. 1952–53 (1955) : 22–23.

The dissertation included an outline of the range of morphological variation of *A. glutinosa* in Britain and a discussion of regional races and of the postglacial history of the species.

2419 MCVEAN, D. N.
Ecology of *Alnus glutinosa* (L.) Gaertn. I. Fruit formation.
J. Ecol. 1955 : **43** : 46–60.

An account of the various ways in which environmental factors appear to affect seed set in English and Scottish alders is given. Pollination experiments showed that the alders of Chippenham Fen, Cambridgeshire, are self sterile.

2420 SØEGAARD, B.
Fem søskendebestøvninger i Europæisk lærk. (**Five sib pollinations in European larch**).
Forstl. Forsøgsv. Danm. 1954 : **21** : 435–47.

One of six trees from the offspring of a single, open-pollinated European larch was used to pollinate the other five. Ten years after pollination, a significantly higher proportion of badly shaped trees was found in the progeny of a female parent characterized by a crooked trunk than in the four other progenies.

2421 JAMBLINNE, A. DE
Hybridations expérimentales dans le genre *Pinus*. I. Croisement expérimental entre *Pinus nigra* Arnold et *Pinus sylvestris* L. (**Experimental hybridizations in the genus *Pinus*. I. Experimental crosses between *P. nigra* Arnold and *P. sylvestris* L.**).
Z. Forstgen. Forstpflanzenz. 1954 : **3** : 126–30.

The results of experimental crosses carried out at the Centre for Forest-tree Breeding, Bokrijk, Belgium, are reported. Six viable seeds, all of which were heavier than the seeds of either parent species, were obtained by pollinating *P. nigra* with pollen from *P. sylvestris*. No viable seeds were obtained from the reciprocal cross.

2422 MIROV, N. T.
Apache pine and its relationship to ponderosa pine.
Madroño, S. Francisco 1954 : **12** : 251–52.

A promising hybrid has been obtained between *Pinus ponderosa* and *P. latifolia*. Some taxonomists, however, regard the latter pine as a variety of the former. The author reports that the turpentine of *P. latifolia* does not contain δ-3-carene, which is found in all the other varieties of *P. ponderosa* investigated; *P. ponderosa* and *P. latifolia* are therefore regarded as specifically distinct.

2423 **Annual Report of the Department of Forestry, Union of South Africa, for the year ended 31st March, 1953** (1954) : Pp. 36.

Plants raised from seed of selected trees of *Pinus patula* are being grown in replicated plots for comparison with unselected seedlings and are expected to provide a valuable source of breeding material. Segregation is occurring in the progeny of the hybrid *P. patula* x *P. muricata*, both parental and intermediate types being represented.

2424 Yamazaki, T., Iwamura, M. & Ogasawara, K.
Die Untersuchungen über Rassen von japanischen Rotkiefern. III. Die morphologische Veränderung der Nadeln von Kiefern im Baumalter. (**Investigations on the races of *Pinus densiflora*. III. Morphological changes of the needles of the pine with age of tree**).
Saikyo Daigaku Gakujutsu Hokoku, Nogaku/Sci. Rep. Saikyo Univ., Agric. 1953 : No. 5 : 155–63.

It is noted that the needles from trees collected throughout Japan differ considerably in size and anatomical characteristics according to the age of the tree, but that racial differentiation in respect of needle morphology is not apparent.

2425 Migita, K.
(**Cuttings of races of *Cryptomeria japonica***).
Nihon Ringaku Kai Shi/J. Jap. For. Soc. 1954 : **36** : 202–03. [Japanese].

Data are provided on the rooting capacity and callus formation of cuttings from 18 Japanese races.

2426 Andersson, E.
Pollenspridning och avståndsisolering av skogsfröplantager. (**Pollen dispersal and the spatial isolation of forest seed plantations**).
Medd. SkogsforsknInst. Stockh. 1955 : No. 35 : 35–100.

Observations made during 1953–54 on the abundance of pollen of Norway spruce and Scots pine at varying distances from pure and mixed stands in different parts of Sweden are reported and emphasis is laid on the necessity of maintaining seed plantations at distances sufficient to isolate them from sources of contaminant pollen.

2427 Løfting, E. C. L.
Danmarks ædelgranproblem. 1.Del. Proveniensvalg. (**Denmark's silver fir problem. Part 1. Choice of provenance**).
Forstl. Forsøgsv. Danm. 1954 : **21** : 337–81.

In trials involving *Abies alba* of Danish or foreign provenance, the limiting factor in the adaptation of this species to Danish conditions appeared to be its high precipitation requirements. The greatest vigour, drought tolerance and *Chermes* resistance were found in material from the eastern and southern limits of its natural range.

A. nordmanniana of Danish provenance, which was included in the experiment, showed higher *Chermes* resistance than did hybrids between it and the species *A. alba* and *A. cephalonica.*

2428 Rohmeder, E.
Umwelt und Erbanlagen bei der Fichtensamenausbeute. (**Environment and hereditary constitution in the yield of spruce seed**).
Z. Forstgen. Forstpflanzenz. 1954 : **3** : 113–18.

The results of experiments at the Institute of Forestry and Plant Breeding, Munich, to determine the relative importance of external environment and genetical factors in the seed production of spruce are presented. Geographical locality and weather conditions at time of flowering considerably influenced the amount of seed produced, but differences also existed between trees grown under identical conditions. Number of ovules, receptivity of the ovules to fertilization and 1000-seed weight appeared to be genetically determined. On the basis of these studies, the selection of plus trees combining high yields of seed with rapid growth and satisfactory shape is recommended.

2429 Schmidt, H.
Kartierung bodenständiger Bestände. (**Mapping native stands**).
Z. Forstgen. Forstpflanzenz. 1954 : **3** : 118–22.

Recent investigations carried out in the Selb Forestry Reserve, the most important source of pine seed in Bavaria, showed that 60 of the 169 ha. certified for seed production contained trees which were either descended from seed of foreign provenance introduced into the reserve in the course of the last five centuries or hybrids between these introductions and the local race. Of a total of 1899 ha. in the reserve devoted to the growing of pine trees, approximately one third showed signs of contamination by foreign stock. A survey map of native stands has now been prepared, and it is proposed to eliminate gradually all hybrid trees and trees of foreign provenance, as these are decidedly inferior to the pure Selb race. The advisability of setting up seed nurseries to obviate difficulties arising from the inadvertent use of impure stock for seed purposes is discussed.

2430 Brandt, K.
Proveniensforsøg med Skovfyr m.v. i Jørgensens Plantage, Djursland. (**Provenance trials with Scots pine etc. in Jørgensen's Plantation, Djursland**).
Forstl. Forsøgsv. Danm. 1954 : **21** : 449–50.

Observations made in 1925, 1947 and 1953 on *Pinus sylvestris* of Danish and foreign provenance, planted between 1913 and 1917, showed that all types were subject at some stage of their development to attack by *Fomes annosus* and and *Myelophilus piniperda*. Of the other pine species planted at the same time, *P. nigra* var. *austriaca* grew best, although none showed really satisfactory growth.

VEGETABLES

2431 **The Report of the Principal to the Governing Body, Wye College, for the year 1953-54** (1955) : Pp. 64.

In the report on the activities of the Department of Horticulture the following investigations are mentioned. Tests of spinach varieties and strains indicated that ♂ plants are unsatisfactory as foliage producers; their numbers should be reduced by removal at an early stage in the growth of the crop and by selective breeding. Progress has been made in selecting strains of tomato, beet and Brussels sprouts. The value of F_1 tomato hybrids is being investigated. A satisfactory technique for the commercial production and drying of hybrid sweet corn seed was developed.

2432 Miljčin, M. I.
(**The best vegetable varieties for cultivation under glass**).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 2 : 24–25. [Russian].

Recommendations, based on the results of trials at the Timirjazev Agricultural Academy, are made as to the varieties of radish, cauliflower, lettuce, cucumber and tomato most suitable for cultivation under glass. A strain of Klinskiĭ selected at the institute outyielded all other cucumbers.

2433 Nilsson, F.
Från Statens trädgårdsförsöks verksamhetsfält. (**News from the National Horticultural Experimental Centre**).
Svensk JordbrForsk. Årsb. 1954 : 7–17.

The beginning of horticultural research in Sweden and its subsequent development, which now includes experiments on the improvement of fruit trees, berries, vegetables and ornamental plants by breeding and various cultural and other methods, carried out at Alnarp and under the National Research Service, are described. Better yields and quality as well as resistance to cold, diseases and pests are among the main objectives in this field of research.

2434 **Report of the Minister of Agriculture, Province of Ontario, for the year ending March 31st, 1954** : Pp. 189.

The following work of interest to plant breeders was carried out at the Horticultural Experiment Station, Vineland:—

Rhubarb. Breeding and selection continued to obtain improved rhubarb for processing and also better varieties for fresh use and forcing.

Tomato. Selections from crosses of Farthest North and other very early varieties with late varieties such as Rutgers are being repeatedly back-crossed with late high-quality varieties to develop an earlier maturing and otherwise improved processing tomato. The factor *ps* (position sterile) is being transferred to parents of the most promising F_1 hybrids with a view to reducing the cost of F_1 seed production. An attempt is being made to incorporate the character of jointless fruit-stem in commercial varieties; this character would reduce the cost of picking.

The greenhouse tomato Vagabond (V–508), immune from all known races of *Cladosporium fulvum*, has been introduced. It was developed by crossing Vetomold and *Lycopersicon hirsutum* 3833, back-crossing twice to Vetomold and then outcrossing to V–469, a line homozygous for the genes of Vetomold and V–121 for leaf-mould resistance.

Sweet corn. Work on the development of hybrids is in progress.

2435 Weibull, G.
Kyllagring av trädgårdsfrö—ett experiment vid Weibullsholm. (**Cold storage of horticultural seed. An experiment at Weibullsholm**).
Svensk JordbrForsk. Årsb. 1954 : 167–68.

The subject of this paper has been more fully reported in English (cf. *PBA*, Vol. XXIV, Abst. 1386).

2436 Banga, O. & De Bruyn, J. W.
Selection of carrots for carotene content.
Euphytica, Wageningen 1954 : **3** : 203–11,

Investigations carried out at the Institute of Horticultural Plant Breeding, Wageningen. Netherlands, have indicated that the most representative values for total carotenoid content are obtained by (1) analysing the root when it is sufficiently coloured but before the maximum carotenoid content has been reached, (2) calculating the carotenoid content on a dry-weight basis and (3) taking into account the weight of the carrot expressed in grammes of dry matter. In comparing individual carrots, standard curves obtained by plotting the total carotenoid content in mg. per 10 g. of dry matter against root weight may be useful as a guide to the most appropriate time to sample before the maximum content is attained. When a large number of roots is available, as in the comparison of varieties and strains, periodical carotenoid estimations can be made among the many roots available, so that information on the course of carotenoid production can be obtained and the best time for analysis can be chosen afterwards.

2437 Carlson, G.

Palsternacka Tribut OJO/48. (**The parsnip Tribut OJO/48**).

Våren 1955. Hammenhögs, Otto J. Olson & Sons AB : p. 6.

Originally put on the Swedish market as a first class strain under the name Halvlång OJO/42 [Semilong OJO/42], this variety was retested in the classifying trials at Alnarp during 1947–49 and was then renamed Tribut OJO/48 [Tribute OJO/48]. It has smoother and handsomer roots than the English variety Intermediate from which it was obtained by selection and also surpassed Student (cf. *PBA*, Vol. XVI, Abst. 956) in yield and quality in Hammenhög trials. Its rapid growth makes it suitable for early use and its shape facilitates lifting.

2438 Shimokawa, M. *et al.*

(**Progress in breeding the Miura radish**).

Kanagawa Noji Shikenjo Engeibun Kenkyu Hokoku/Bull. hort. Sect. Kanagawa agric. Exp. Sta. 1953 : No. 1 : 9–13. [Japanese].

Selection and hybridization work with numerous strains of the Miura radish is described. A new strain, Wasemiura [Early Miura] has been produced, and is recommended on account of its earliness, resistance to cold and reduced tendency towards sponginess.

2439 Zlatkovský, A.

Obří ředkvičky. (**Giant radishes**).

Za socialist. Zeměd. 1954 : 4 : 1325–26.

Descriptions are given of oriental varieties of *Raphanus sativus* interesting for their large roots and resistance to diseases. They are regarded as suitable for cultivation and breeding work in Czechoslovakia.

2440 Davis, E. W.

Nature of sterility in the amphidiploid *Allium cepa-fistulosum*.

Amer. J. Bot. 1955 : **42** : 41–48.

The amphidiploid of *A. cepa* x *A. fistulosum* set less seed than the parent species. The amphidiploid did not differ from the parent species in percentage of stainable pollen. The expression of sterility was similar in the amphidiploid and parents, embryo abortion being most frequent between the fifth and eighth days after anthesis. The sterility of the amphidiploid form is regarded as predominantly genic and is ascribable to one of three causes: (1) complementary genes, (2) genes carried over from one or both parents, and (3) a change in the genic balance brought about by the cumulative action of some genes and the noncumulative action of others in the polyploid condition. Three possible ways of overcoming the problem of sterility are suggested: (1) selection for fertility within segregating amphidiploid lines, (2) selection of parents with few or no genes for sterility, and (3) crossing autotetraploids of the two species, derived from parents without genes causing sterility.

2441 De, D.

Triploidy in *Allium cepa* Linn.

Sci. & Cult. 1954 : **20** : 300–01.

A single bulb of *A. cepa* producing triploid root-tips ($2n = 24$) has been discovered at the Department of Botany, University College of Science, Calcutta.

2442 Beraha, L.

Susceptibility of *Allium* spp. to *Puccinia asparagi*.

Plant Dis. Reptr. 1955 : **39** : 98–100.

Several species of *Allium*, the progeny of two interspecific crosses and the eight horticultural varieties of *A. cepa* tested were similar in their susceptibility to inoculation with *P. asparagi*, the species *A. porrum*, *A. sativum* and *A. ampeloprasum* being apparently immune.

2443 **Two new shallots.**

Seed World 1955 : **76** : No. 1 : p. 18.

The shallots Bayou Pearl and Wintergreen, released by the Louisiana Agricultural Experiment Station, were selected from Louisiana Pearl and are recommended for autumn and spring production respectively.

2444 Neenan, M. & Goodman, O. G.

Varietal susceptibility of brassicas to molybdenum deficiency.

Nature, Lond. 1954 : **174** : 972–73.

The cauliflowers Cambridge 6 and Cambridge 7 have displayed a high degree of susceptibility to whiptail in the Republic of Ireland. The cauliflowers Yates Progress and Autumn Giant, the Brussels sprouts Cambridge 1 and Cambridge 3 and the broccoli Early Feltham were moderately to slightly affected. Among the unaffected brassica varieties was the cauliflower All-the-Year-Round.

2445 **New asparagus and rhubarb.**
NJ Agric. 1954 : **36** : No. 6 : 4–5.

The asparagus Raritan, a selection of Carter's Special, and the rhubarb Jersey (MacDonald x Sutton's Seedless) have been developed at the New Jersey Agricultural Experiment Station. The spear tips of Raritan remain tight until the stalks reach a height of 18–20 inches; the variety is suitable for both processing and the fresh market. Jersey gives high yields of long, thick stalks with a good flavour.

2446 ČEREEVA, S. N. & GONČARIK, M. N.
(**The production of new forms in the cabbage variety Nomer Pervyĭ when grown in the far north**).
Agrobiologija (Agrobiology) 1954 : No. 6 : 62–69. [Russian].

In a season marked by warm spells during the period from 15 June to 16 August the inheritance of Nomer Pervyĭ [Number One], grown under subarctic conditions, was shattered and many abnormal forms arose. Some of the new forms resembled Savoy cabbage or Brussels sprouts and others differed from type in growth habit and shape of leaves and heads.

2447 JENSMA, J. R. & KRAAI, A.
Practijkproeven met rode kool 1950–1951. (**Commercial trials of red cabbage, 1950-1951**).
Meded. Inst. Vered. TuinbGewass. 1954 : No. 57 : Pp. 36.

The results of trials of 36 varieties and selections at different centres in the Netherlands are presented, together with data on yield, maturity, shape, appearance, keeping quality and average weight and size. Langendijker Vroege Rode [Langendijk Early Red] and Langendijker Herfstrode [Langendijk Autumn Red] were the best varieties in the early and late groups respectively. Langendijker Rode Bewaar [Langendijk Red Keeping] was superior in keeping quality.

2448 JENSMA, J. R. & KRAAI, A.
Praktijkproeven met witte kool. (**Commercial trials of cabbage**).
Meded. Inst. Vered. TuinbGewass. 1955 : No. 61 : Pp. 35.

Recommendations are made as to varieties and strains suitable for cultivation in the Netherlands. Data on yield, quality, maturity, keeping properties and average size and weight are included.

2449 RUBIN, B. A.
(**Biochemical principles for the storage of vegetables and fruit**).
Vestn. Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1954 : No. 10 : 48–56. [Russian].

Reference is made to a strain of the cabbage Amager, selected at Gribovo, which surpasses the initial form in keeping quality.

2450 BAIN, D. C.
Resistance of cabbage to blackrot.
Phytopathology 1955 : **45** : 35–37.

Selections resistant to black rot (*Xanthomonas campestris*) were obtained from the varieties Huguenot, Early Fuji and Round Dutch. The resistance of the Round Dutch selection, however, broke down under severe conditions of testing. F_1 progenies from crosses of the Huguenot selection with susceptible varieties did not develop symptoms in severe inoculation tests at the age of about 5 weeks. The results of seed inoculation tests of the F_2 progenies of some of these crosses revealed that resistance depended upon a single dominant gene.

2451 BAIN, D. C.
Disappearance of blackrot symptoms in cabbage seedlings.
Phytopathology 1955 : **45** : 55–56.

Further investigations on Copenhagen Market and Wisconsin All Seasons, regarded as resistant and susceptible to black rot (*Xanthomonas campestris*) respectively, have shown that in neither variety is the percentage of plants with diseased cotyledons indicative of the percentage of plants eventually developing symptoms (cf. *PBA*, Vol. XXII, Abst. 789). Although seed inoculation is an effective means of evaluating resistance, other methods should be employed for accurate determinations.

2452 MUNGER, H. M. & NATTI, J. J.
Empire Danish: A new yellows-resistant cabbage.
Fm. Res. 1955 : **21** : p. 10.

The cabbage Empire Danish, resistant to *Fusarium* yellows, was developed by crossing Wisconsin Ballhead with Donk's Danish and by repeated back-crossing to the latter variety.

2453 McCUBBIN, E. N., JAMISON, F. S., RUPRECHT, R. W. & WOLF, E. A.
Cabbage varieties adapted to commercial production in Florida.
Bull. Fla. agric. Exp. Sta. 1952 : No. 501 : Pp. 29.

A summary is given of the results of trials carried out on 89 varieties of cabbage in Florida during the period 1933–51.

2454 Schwanitz, F.
Über somatische Mutationen der Zellgrösse bei Grünkohl und ihren Einfluss auf Form und Qualität. (**On somatic mutations in the cell size of kale and their influence on shape and quality**).
Züchter 1955 : **25** : 26–33.

At the Max Planck Institute for Breeding Research, Niedermarsberg, Westphalia, a high rate of somatic mutation, varying from 8·7% in 1951 to 5·4% in 1952, was observed in the progeny of F_2 kale x savoy hybrids backcrossed to kale. Mutated leaves displayed varying degrees of crinkling, and many sectorial chimeras, in which crinkling was more pronounced in one section of the leaf than in others, were also found. The size of the cells and nuclei of crinkled leaves varied according to the degree of crinkling, cells being smallest in strongly crinkled leaves. Crinkling is attributed to the mutation of one major gene, with one or more minor genes possibly affecting the degree of crinkling; genes for cell size are inherited independently of those for crinkling but undoubtedly exercise an inhibitory or additive effect on the extent of crinkling. Slightly crinkled leaves possessed better cooking properties than strongly crinkled leaves.

2455 Finch, C. G.
Early cauliflower variety trials: 1950-3.
J. nat. Inst. agric. Bot. 1954 : **7** : 87–99.

Data on 13 trials of the varieties 110 (control), Meteor, Pioneer, Remme, Snowdrift and Early Erfurt, conducted at seven English stations, are presented. Pioneer, 110 and the later-maturing variety Snowdrift gave the best yields of high quality heads.

2456 Jensma, J. R. & Kraai, A.
Practijkproeven met spruitkool 1950–1951. (**Commercial trials of Brussels sprouts, 1950-1951**).
Meded. Inst. Vered. TuinbGewass. 1954 : No. 58 : Pp. 23.

Data are presented on the pedigree, average yield, growth habit, degree of compactness of the leaves, winter hardiness and earliness of 12 new strains of Brussels sprouts tested at Wageningen, Netherlands, in 1950–51 and approved by the adjudicative committee.

2457 Finch, C. G.
Brussels sprouts variety trials 1949-53.
J. nat. Inst. agric. Bot. 1954 : **7** : 100–20.

The results of replicated trials of ten varieties carried out at 26 stations in Great Britain are reported. The control, Cambridge 1, was exceeded in total yield by the early varieties Best of All, Masterman and Masterpiece (Brown's stock) and by the midseason variety Evesham Special, which was also of superior quality.

2458 Janick, J.
Genetics of sex determination in *Spinacia oleracea* L.
Diss. Abstr. 1954 : **14** : Publ. No. 9355 : p. 1507.

A single gene pair, whose members are designated *X* and *Y* although heteromorphic sex chromosomes are not cytologically distinguishable, was found to determine the 1 : 1 sex ratio in diecious strains, pistillate and staminate plants having the constitution XX and XY respectively. The monecious condition depended upon at least one major gene X^m, allelic to *X* and *Y* and incompletely dominant to *X* and completely recessive to *Y*. Modifiers affected the expression of monecy, and by inbreeding combined with selection plants were obtained whose progeny mean values were 70–80% for femaleness. By crossing these monecious plants with pistillate individuals, progenies 80–90% pistillate were secured. In the presence of an abundant source of pollen, such lines could be utilized as ♀ parents in hybrid seed production or in developing inbreds which could be combined to synthesize open-pollinated varieties. Doubling of the chromosomes had no effect on the expression of diecy or monecy. From $2n$ x $4n$ and $4n$ x $4n$ crosses it was however apparent that a single dose of *Y* caused the plant to be staminate, even in combination with three doses of *X*. The triploid form was highly fertile. A temperature of 80° F. led to a shift towards maleness in a true-breeding monecious variety. A relationship between maleness and day length was also detected under conditions of high temperature.

2459 Katayama, Y. & Shida, S.
(**On intersexual spinach plants**).
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 101–04. [Japanese].

An investigation of a Japanese variety in which a high frequency of intersexual flowers occurred is reported. The frequency of flowers intermediate between the female and typical intersexual types rose with decreasing photoperiod. A negative correlation was found between the number of spines on the nut and the intersexuality index, measured according to the scale $1 \rightarrow 0 \rightarrow -1$, for female, typical intersexual and male flowers, respectively.

2460 HAYASE, H. & KOMOCHI, S.
(Sexual differentiation of asparagus utilizing the degree of resistance to the toxic action of potassium chlorate).
Hokkaido Nogyo Shikenjo Iho/Res. Bull. Hokkaido agric. Exp. Sta. 1954 : No. 66 : 85–91. [Japanese].

Variable results, probably due to cultural conditions, were obtained in earlier experiments in which sexual differentiation of asparagus by means of potassium chlorate treatment was attempted. The authors found, however, that if asparagus plants were placed in illuminated water cultures for 5 days before chlorate treatment, the female plants were injured but not the male.

2461 HELM, J.
Lactuca sativa L. in morphologisch-systematischer Sicht. **(*L. sativa* L. from the standpoint of morphology and systematics).**
Kulturpflanze, Berlin 1954 : **2** : 72–129.

A history of the cultivation of the lettuce is given, views by different authors on its geographical origin and later distribution are discussed, and an attempt is made to classify varieties according to a morphological study of the leaves and their ontogeny. The literature on the inheritance of various morphological characters is also reviewed.

2462 WHITAKER, T. W. & BOHN, G. W.
Mosaic reaction and geographic origin of accessions of *Cucumis melo* L.
Plant Dis. Reptr. 1954 : **38** : 838–40. (Mimeographed).

Some 700 accessions of *C. melo* from Asia, Europe, Africa and South America were exposed to infection by cantaloupe mosaic in California during the period 1948–52. Of the 23 accessions showing some resistance or tolerance most were of Chinese and Korean origin and 18 appeared to pertain to the botanical variety *conomon.*

2463 FOSTER, R. E.
A new cantaloup for the Yuma area.
Progr. Agric. Ariz. 1955 : **6** : No. 4 : p. 3.

The variety Arizona Sunrise, developed by the Arizona Agricultural Experiment Station from a cross between a medium early commercial variety and a breeding strain from the University of Arizona, is earlier and of higher quality than the standard varieties MR45 and SR91 but tends to produce small fruit. It is not severely attacked by crown blight.

2464 TANAKA, M. & TABATA, M.
(Studies on artificial polyploid melons. II. On investigations into pollen germination).
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 105–11. [Japanese].

A comparative description of pollen grain morphology and pollen tube development in diploid and tetraploid melon strains is given. The optimum pH for the growth of normal pollen tubes is 6·2; that for pollen from 4*x* plants, 5·6. Pollination was effective in the combination 4*x*♀ x 2*x*♂ but not in the reciprocal.

2465 GREBENŠČIKOV, I.
Notulae cucurbitologicae I. Zur Vererbung der Bitterkeit und Kurztriebigkeit bei *Cucurbita pepo* L. **(Notes on *Cucurbita*. I. On the inheritance of bitterness and short vines in *C. pepo* L.).**
Kulturpflanze, Berlin 1954 : **2** : 145–54.

The results of crosses effected at the Institute of Research on Crop Plants, Gatersleben, Germany, indicated that the bitterness of the flesh of *C. pepo* is due to a single dominant gene, designated *Bi*. It is thought that bitterness in *C. mixta*, the putative ancestor of *C. pepo*, depends upon other factors. Short vines were dominant over long vines and appeared to be polygenically determined.

2466 SCARCHUK, J.
Fruit and leaf characters in summer squash. The interrelationship of striped-fruit and mottled-leaf.
J. Hered. 1954 : **45** : 295–97.

The inheritance of the characters of mottled *vs.* uniform leaf, yellow *vs.* green fruit and striped *vs.* uniform fruit was studied in the F_2 of the cross Caserta x Early Prolific Straightneck of *Cucurbita pepo*. The segregation ratios for each pair of these characters, either alone or in combination with the other characters, indicated that each pair was simply inherited. The symbol *St* is proposed for the dominant allele determining striped fruits. It is suggested that the symbol *M* used by Scott and Riner (cf. *PBA*, Vol. XVI, Abst. 1436) for the dominant allele for mottled leaf in *C. maxima* be adopted for the gene determining the same character in *C. pepo*. The dominant gene for yellow fruit colour is designated *Y*, in accordance with the nomenclature used by Sinnott and Durham.

2467 SCHÖNIGER, G.
Beobachtungen zur Vererbung gewisser Testaeigenschaften bei *Curcurbita pepo* L. (**Observations on the inheritance of certain properties of the testa in *C. pepo* L.**).
Züchter 1955 : **25** : 86–89.

The results of further studies at the Botanical Institute, Würzburg University, on the inheritance of hard testa in the pumpkin are reported (cf. *PBA*, Vol. XXI, Abst. 2221 and Vol. XXIII, Abst. 1547). Observations on the degree of lignification at different stages of development in the immature seeds of the F_3 and F_4 of crosses between the thick-coated variety Zucchino on the one hand and the thin-coated varieties Mischitzer Ölkürbis [Mischitz oil pumpkin] and Steirischer Ölkürbis [Styrian oil pumpkin] on the other indicated the presence of two groups of modifiers, one affecting the period in the development of the seed at which lignification commences and the other the extent of lignification. Both groups of modifiers weakened the effect of *N*, the subsidiary gene for lignification. Late initiation of lignification was characteristic of plants with thin-coated seeds.

2468 YAMANE, Y.
(**Studies on interspecific hybrids in *Cucurbita*. II. On F_1 hybrids of *C. moschata* x *C. maxima***).
Seiken Jiho/Rep. Kihara Inst. biol. Res. 1953 : No. 6 : 112–16. [Japanese].

In spite of earlier failures, the author succeeded in obtaining a vigorous plant from the combination *C. maxima* 'Iwateirokuri' x *C. moschata* 'Wasekurokawa,' and a slowly growing plant from the reciprocal (cf. *PBA*, Vol. XXIV, Abst. 714). In both hybrids, the usual meiotic configuration was $19_{II} + 2_{I}$, occasional cells having 20_{II}. Pollen fertility was 10·10% in the vigorous hybrid and 0% in the other.

2469 WEILING, F.
Über die interspezifische Kreuzbarkeit verschiedener Kürbisarten. (**On the interspecific crossability of various species of *Cucurbita***).
Züchter 1955 : **25** : 33–57.

Interspecific crosses carried out at the Institute of Agricultural Botany, Bonn University, resulted in the following percentage fruit sets. *C. maxima* x *C. pepo* 39·6%, reciprocal 16·7%; *C. maxima* x *C. ficifolia* 22.1%, reciprocal 2·2%; *C. ficifolia* x *C. pepo* 2·7%, reciprocal 0%; and *C. maxima* x *C. moschata* 25·6%, no reciprocal cross effected. The fruits that developed were morphologically identical with those obtained from the ♀ parent when selfed but many of the seeds were found to be deformed or inviable; sterility is attributed to zygotic lethality as the result of genetic incompatibility. The embryos of viable seeds were excised and cultivated on artificial media. An F_1, which could be backcrossed to both parents, was obtained from *C. maxima* x *C. pepo*. In this cross, long runners were dominant over short; the majority of the hybrids proved intermediate between their parents in the number, shape, size, colour and degree of hairiness of their leaves; and numerous abnormalities were observed in the flowers. In some plants, heterotic effects were apparent although in the majority of cases rate of growth and vegetative vigour were intermediate between those of the parent species. *C. maxima* x *C. ficifolia* and the reciprocal also gave viable seeds; the cross between *C. ficifolia* and *C. pepo* resulted in a small number of hybrid plants being obtained, most of which were sterile. A comparatively large number of hybrids were obtained from *C. maxima* x *C. moschata*.

In conclusion, the results of these hybridization experiments are discussed in relation to the general systematics, morphology and genetic constitution of species appertaining to the genus *Cucurbita*.

2470 HAYASE, H.
(**Studies on cucurbit crosses. III. Physiological studies on hybrid combinations between male and female flowers of various ages**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 41–46. [Japanese].

The fruit and seed sets of intervarietal crosses of *Cucurbita maxima*, *C. moschata* and *C. pepo*, involving combinations of flowers at various ages, were investigated. Age of pollen, which is correlated with the content of soluble substances in the grain, had a greater effect on fertility than age of pistil. Pollen at the bud stage was less effective than pollen from open flowers. Varietal differences were noted in the degree of depression of fertility due to pollen immaturity.

2471 WITTWER, S. H. & HILLYER, I. G.
Chemical induction of male sterility in cucurbits.
Science 1954 : **120** : 893–94.

The successful induction of male sterility in *Cucurbita pepo* 'Table Queen' by treatment with α–naphthaleneacetic acid or maleic hydrazide suggests that the use of chemically induced male sterility in the commercial production of

F_1 hybrid seed of this species and other cucurbits may be feasible.

2472 Owens, E. W.
Dimorphism of fruit form in Butternut squash, *Cucurbita moschata* Duch.
Diss. Abstr. 1954 : **14** : Publ. No. 9770 : 1894–95.

Dimorphic aberrants of the Butternut squash bear in the apical portions of the plant fruits closely resembling the elongate fruits of certain Cushaw types, particularly those of Winter Crookneck. Data from various crosses have suggested that the undesirable dimorphic aberrant is chiefly due to mutation at an unstable locus. X-ray experiments did not indicate that the locus concerned was unusually sensitive to ionizing radiation. Winter Crookneck or a closely related form of this variety is believed to be the progenitor of Butternut. It is suggested that in view of the difficulty encountered in developing nonmutating strains of Butternut, genes for fruit form could be transferred to Butternut from other short-fruited Cushaw types which have not been observed to mutate.

2473 Prym–von Becherer, L.
Untersuchungen zur Anatomie und zum Erbverhalten der Samenschalen von *Cucurbita maxima* Duch. und *Cucurbita pepo* L. (**Investigations on the anatomy and mode of inheritance of the testas of *C. maxima* Duch. and *C. pepo* L.**).
Züchter 1955 : **25** : 1–14.

Experiments at the Institute of Agricultural Botany, Bonn University, showed brown testas to be dominant over white and hard testas over soft. In *C. maxima*, plants with white testas proved homozygous for this character, whereas forms possessing brown testas segregated, when selfed, in the proportion 3 brown : 1 white. Testa colour was then determined by a single gene pair. In *C. pepo*, plants with soft testas were homozygous for this character; some forms with hard testas were homozygous, others heterozygous. Modifiers appear to influence the degree of hardness or softness of the testa in each group.

2474 Singh, H. B. & Sikka, S. M.
'Summer Prolific' is a heavy yielder.
Indian Fmg. 1955 : **4** : No. 10 : 20–22.

The bottle-gourd variety Pusa Summer Prolific, selected from local material at the Indian Agricultural Research Institute, New Delhi, produces 10–15 fruits per plant, up to 30 inches long when fully mature.

2475 Henriksen, A.
Sorts- og stammeforsøg med pickles- og sylteagurker 1951–53. (**Trials of strains and varieties of gherkins and pickling cucumbers 1951-53**).
Tidsskr. Planteavl 1955 : **58** : 606–26.

Details are given of trials of 17 strains of gherkins (up to 6 cm. in length) and 16 strains of pickling cucumbers (6 to 12 cm. in length) conducted at four stations in Denmark. Seven of the former group and six of the latter reached an approved standard of yield and quality, producing averages of 3804 and 2112 fruits per 100 m², respectively.

2476 Aleksandrov, S., Volkov, V. & Pestova, L.
(**New methods of seed production under screens**).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 12 : 15–18. [Russian].

The yields and earliness of indoor cucumbers and tomatoes at the Institute of Plant Industry were improved by (1) growing the élite seed in an outdoor nursery, (2) selecting seed for large size, (3) intravarietal pollination and (4) intervarietal hybridization. The intravarietal crosses involved plants of different provenances in order to enhance the physiological differentiation between the male and female gametes. Similar effects were obtained by adding the pollen of other species to self pollen, e.g. tomato pollen in the case of the cucumber Klinskiĭ 1545. Data on heterotic effects obtained in cucumber and tomato by intervarietal hybridization are presented.

2477 Bailey, R. M.
Cucumber scab resistant varieties pay off!
Maine Fm. Res. 1955 : **2** : No. 4 : 10–12.

The slicing variety Highmoor (cf. *PBA*, Vol. XVIII, Abst. 1343) and the pickling variety WSR6 (National Pickling x Maine 2) are recommended. WSR6 is superior in yield to National Pickling and resembles Maine 2 in resistance to *Cladosporium cucumerinum*.

2478 Linnasalmi, A.
Avomaan kurkkulajikkeiden laikkutaudinkestävyydestä. (**Resistance to mosaic in outdoor cucumber varieties**).
Koetoim. ja Käytäntö 1954 : p. 15.

Results of experiments on mosaic resistance in several foreign varieties are briefly reported. While the incidence of the disease in the most commonly cultivated variety Muromin was about 32%, it was very noticeably less in the American varieties Highmoor, Maine 2, and Wisconsin SR, where the incidence was only 1–3%.

2479 Chodat, F. & Gagnebin, F.
Caractères principaux de 23 variétés de tomates. (**The principal characteristics of 23 tomato varieties**).
Rev. hort., Paris 1955 : **127** : 1190–93 ; 1220–225.

Data on growth habit, fertility, disease resistance, maturity, transportability and morphology of the leaves, flowers and fruit are presented for 23 varieties grown at the Experimental Station of the Faculty of Botany, Geneva University, in 1953 (cf. *PBA*, Vol. XXII, Abst. 3051).

2480 Giles, J. E.
Desirable combinations of characters in F_1 hybrid tomatoes for the glasshouse.
J. Aust. Inst. agric. Sci. 1954 : **20** : 238–42.

Experiments on hybridization with glasshouse tomatoes were carried out to determine whether the desirable characters of pairs of varieties could be combined in F_1 hybrids. Two of the combinations tested, South Australian Dwarf (strain C) x Vetomold and Tatinter x Vetomold, combined high yielding capacity, good growth habit, high percentage of smooth first-grade fruit, early ripening and leaf-mould resistance. The yields of the two hybrids did not differ significantly from those of the parents.

2481 Podešva, J.
Výsledky pokusů s využitím heterose u rajčat pro rychlírny i polní pěstění. (**The results of experiments on producing heterosis in tomatoes grown for indoor and outdoor use**).
Sborn. vysoké Škol. zeměd. les. Brno 1954 : No. 2 : 11–18.

Break o'Day x Principe Borghese surpassed all other hybrids in earliness and yield in field tests in Moravia. Of the hybrids for indoor cultivation a high degree of heterosis was shown by various hybrids involving Ostravské as a parent, Ostravské x NN55 being outstanding among them. Ostravské was bred from Mikado, Bonner Beste and *Solanum racemigerum*. It shows resistance to *Cladosporium*.

2482 Axelsson, F.
A new F_1-variety of tomato resistant to *Cladosporium*.
Agri hort. genet., Landskrona 1954 : **12** : 191–201.

A hybrid developed at Weibullsholm, Sweden, from a cross between an American male-sterile hybrid and a Swedish line involving *Lycopersicon pimpinellifolium* in its pedigree, is described. Designated Immuna, it is suitable for forcing in greenhouses, is resistant to *Cladosporium fulvum*, matures early and produces round, smooth-skinned fruits of good eating quality. In trials at various centres in Sweden, Norway and Denmark, it has consistently outyielded all standard varieties, including Potentat, the variety most widely cultivated for forcing in Sweden.

2483 Troníčková-Poláková, E.
Poznatky v šlechtění a pěstování rajčat v Bulharsku. (**Data on breeding and cultivation of tomatoes in Bulgaria**).
Za socialist. Zeměd. 1955 : **5** : 439–42.

This account mentions investigations at Plovdiv of problems relating to hybrid vigour. Wide crossing, for instance between American and Dutch varieties, is a method used extensively in Bulgaria to produce heterotic effects. The high-yielding F_1 hybrids of Zarja [Dawn] (= Break o'Day) x Komet and Nr. 10 x Bison are listed among the certified material. Of the two, the growers prefer the latter on account of its greater earliness. Early varieties with high sugar and vitamin contents were obtained by crossing tomatoes with cultivated forms of *Lycopersicon racemigerum* and *L. pimpinellifolium.* Rutgers is used, especially in crosses with some early-maturing Soviet varieties, to impart improved flavour to new strains. Some determinate varieties bred in recent years in Bulgaria are mentioned.

2484 Quiñones, F. A.
Heterosis in tomatoes as affected by diverse origin of parents.
Diss. Abstr. 1954 : **14** : Publ. No. 9621 : 1895–96.

Experiments were carried out to determine whether heterosis, as expressed in total yield, early yield, yield of grade I fruit and size of fruit, is affected by the introduction of genes from wild species. Four groups of varieties were used as the parents of F_1 combinations: (1) Firesteel, Pritchard and Rutgers, derived from *Lycopersicon esculentum* only; (2) Pan America, Southland, Pearl Harbor and Wisconsin 55, involving *L. pimpinellifolium* in their ancestry; (3) High C and New Hampshire 50 from *L. esculentum* x *L. peruvianum*; and (4) Lanai, Maui and Hawaii including *L. pimpinellifolium* and *L. peruvianum* in their pedigree. Crosses within these groups did not differ significantly from those between parents from different groups, with respect to any one of the characters studied. It is suggested that repeated backcrossing to the *L. esculentum* parent or successive crossing to other cultivated varieties may have eliminated certain genes affecting heterosis.

2485 LEFORT, M.
Action des doses croissantes de rayons X sur les graines de *Lycopersicon esculentum* Mill. (**The action of increasing doses of X rays on seeds of *L. esculentum* Mill.**).
CR Acad. Sci., Paris 1954 : **239** : 1401–04.

Dry dormant seeds of *Lycopersicon esculentum* proved 4–5 times as resistant to X irradiation as seeds previously soaked in water. In the case of seeds irradiated whilst dry, a dose of 20–40,000 r. was necessary to produce mutagenic effects, whereas 5–15,000 r. sufficed in the case of seeds previously immersed in water. Irradiation in excess of these amounts was lethal.

2486 SAGROMSKY, H.
Einfluss von Lichtintensität und Tageslänge auf Wachstum und Pigmentbildung verschiedener Tomatenmutanten. (**Influence of the intensity of light and length of day on the growth and formation of pigments in various tomato mutants**).
Kulturpflanze, Berlin 1954 : **2** : 155–63.

The variety Condine Red and two mutants obtained from it by X irradiation, viz. *aurea* and *Grünkohl* were used in these experiments, which were conducted at the Institute for Research on Crop Plants, Gatersleben, Germany. The *aurea* mutant is characterized by a deficiency in chlorophyll and other pigments, compared with its parent variety; a reduction in light intensity resulted in an increase in the chlorophyll content under long-day conditions, but in a decrease under short-day conditions. When the Grünkohl mutant, characterized by a higher content of pigments than Condine Red, was subjected to conditions of reduced light-intensity, its rate of growth was impeded but, in contrast to Condine Red, it did not become etiolated. The pigment content of both Condine Red and the Grünkohl mutant remained unaffected by a decrease in the intensity of the light.

2487 STUBBE, H.
Über die vegetative Hybridisierung von Pflanzen. Versuche an Tomatenmutanten. (**On vegetative hybridization in plants. Experiments with tomato mutants**).
Kulturpflanze, Berlin 1954 : **2** : 185–236.

The results of experiments at the Institute of Research on Crop Plants, Gatersleben, and at the Institute of Genetics of the University of Halle are reported. Comprehensive descriptions of the mutants used, which were obtained by X irradiation of the varieties Condine Red and Lucullus, are given. Several thousand grafts between these mutants and between the mutants and the two original varieties were carried out but no evidence to support claims by Russian research workers that heritable changes could be effected by grafting was obtained.

2488 KRYŽANOVSKIĬ, F. D.
(**A hybrid between *Cyphomandra* and tomato**).
Vestn. Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1954 : No. **11** : 66–69. [Russian].

At the Principal Botanical Garden, a young plant of the tomato variety Bison was grafted on to a stock of an adult *Cyphomandra betacea* plant. The seed from the scion was used to raise plants that served as scions for grafting in the following year and again for grafting the year after. *Cyphomandra* stocks caused changes in the hereditary constitution of the tomato scions, notably the biochemical, physiological and morphological properties of their fruits. The influence of the stock upon the heritable characters of the tomato was intensified with each successive graft. A hybrid grafted for the third time bore a late-ripening fruit which contained well-developed grey seed, larger than normal tomato seed. A plant grown from this seed was outstanding in vigour and had leaves resembling those of *Cyphomandra*. It produced three large bright-orange fruits of pleasant flavour. Two of them were unilocular; the third was bilocular and contained some seed, from which plants were raised. The new form of tomato is perennial and productive, early and resistant to diseases and low temperatures. It produces large firm-skinned fruits with solid flesh and high sugar, acid and dry matter contents. Their flavour, keeping properties and transporting capacity are good. So far no sexual hybrids of *Cyphomandra* with tomato or the vegetative hybrid have been produced, but the new form sets many fruits when fertilized by the pollen of the tomato Lučšiĭ iz Vseh [Best of All].

2489 KRYŽANOVSKIĬ, F. D.
(**Intergeneric hybridization in the Solanaceae**).
Priroda (Nature), Leningrad 1955 : No. **1** : 55–60. [Russian].

This account of vegetative and sexual hybridization between *Cyphomandra* and the tomato includes a description of the vegetative hybrid referred to in Abst. 2488.

2490 BARTON, D. W.
Comparative effects of X-ray and ultraviolet radiation of the differentiated chromosomes of the tomato.
Cytologia, Tokyo 1954 : **19** : 157–75.

"Cytological analysis at pachytene of F_1 tomato plants from X-ray and ultraviolet pollen treatment has established that there is a higher proportion of deficiencies to translocations following ultraviolet treatment than following X-ray treatment. These results are in agreement with previously-reported research on maize.

"In contrast with previous reports from maize, both X-ray and ultraviolet treatment produced both terminal and interstitial deficiencies in tomato chromosomes. It is suggested that the high proportion of interstitial to terminal deficiencies results from the high selective effect imposed by proximally-localized breakage resulting in long haplo-lethal deficiencies.

"Chromosome breakage, as observed in F_1 plants, was highly localized in the chromatic regions of the chromosomes following both X-ray and ultraviolet treatment. A consideration of the cyclic behaviour of the chromatic and achromatic regions leads to the proposition that greater chromatin volume at the time of applied radiation results in a greater frequency of breakage (or less restitution) in the chromatic regions than in the achromatic regions.

"The cytological behaviour of a number of translocations and deficiencies is discussed. Of particular interest is the cytological behaviour of two deficiency-translocations produced by ultraviolet radiation. One of these is accompanied by an iso-chromosome which exhibits normal centromeric activity with a sub-microscopic centromere. In the other case, rebreakage of a translocated achromatic chromosome segment following chiasma formation provided evidence of the cycly of the achromatic regions through meiotic stages." [Author's summary]

2491 ARTEMJEV, G. V.
(Growing tomato plants for transplanting under conditions of curtailed day length).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 12 : 11–13. [Russian].

At the Arctic Research Station, the yield of some hybrid plants was trebled when they were deprived of natural light for 12 hours a day until the formation of the 8th leaf. When cultivated in this way, some hybrids bred for hardiness gave an F_2 that produced mature fruit and seed under outdoor conditions in the subarctic region. The hybrids are said to include the tomato Gruntovyĭ Skorospelyĭ 337[Early Outdoor 337] x *Solanum schreiteri* and the tomato Gruntovyĭ Gribovskiĭ 351 [Outdoor Gribovo 351] x *S. punae.*

2492 HAFEN, L.
Genetic studies of seven male-sterile mutants of tomato and their value in hybrid seed production.
Diss. Abstr. 1954 : **14** : Publ. No. 9351 : p. 1491.

Seven male-sterile plants collected from commercial plantings of Rutgers and Garden State were each found to depend on a single recessive gene, designated ms_{19}, ms_{20}, ms_{21}, ms_{22}, $sl_{(?)}$, sl_2, and cs, respectively. The mutant $sl_{(?)}$ was apparently the same as the stamenless variant *sl* reported by Bishop. Incompletely fertile plants appeared in the crosses *slsl* x Sl_2sl_2, *slsl* x sl_2sl_2, *slsl* x $Sl_{(?)}sl$, *cscs* x $Sl_{(?)}sl_{(?)}$ and *cscs* x Sl_2sl_2. When these plants were selfed, fertile, incompletely fertile and sterile offspring were obtained. The relationship between *sl*, $sl_{(?)}$, sl_2 and *cs* could be explained by assuming that (1) a genotype heterozygous for any two of these genes is incompletely fertile, or (2) the genes are allelic, any two alleles in the heterozygous condition complementing each other in their effect upon anther production. Some evidence was obtained that a male-sterile strain may not have the same combining ability as the normal form of a variety. In general, hand pollination of male-sterile plants resulted in greater seed production with a smaller expenditure of time than pollination of normal plants, temperatures below 85° F. being preferable. With natural pollination, the amount of seed set by male-sterile plants was low.

2493 PIMENOVA, A. S. & KAMENSKAJA, A. I.
(Improving the resistance of tomatoes to streak).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 2 : 27–30. [Russian].

When plants of Lučšiĭ iz Vseh [Best of All] were treated with borax, $MgSO_4$ or $KMnO_4$ their progeny displayed improved resistance to streak.

2494 LEHMANN, C.
Das morphologische System der Kulturtomaten (*Lycopersicon esculentum* Miller).
[The morphological classification of the cultivated tomato (*L. esculentum* Miller)].
Kühn-Archiv 1954 : **68** : 360–61. (Abst.).

The results of morphological studies of the tomato at the Institute of Research on Crop

Plants, Gatersleben, Germany, are presented and a revised system of classification for the genus *Lycopersicon* is proposed.

2495 ALEKSANDROV, S. V. & KARAULOVA, A. I.
(Tomato varieties for cultivation under glass).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 2 : 20–23. [Russian].

A number of new varieties bred especially for cultivation under glass at the Institute of Plant Industry have outyielded Bison and Budennovka, the early-maturing and midseason standards respectively.

2496 GALLEGLY, M. E. & MARVEL, M. E.
Inheritance of resistance to tomato race 0 of *Phytophthora infestans*.
Phytopathology 1955 : **45** : 103–09.

Two types of resistance to race T_0 of *Ph. infestans* were found in West Virginia tomato accessions and some commercial varieties. One type, occurring in accessions 36 and 106, appears to be controlled by one or more dominant genes designated TR_1 and shows simple Mendelian inheritance; the other, which is apparently governed by multiple genes, is found in varying degrees in accessions 19 and 731–1 and in the varieties Southland and Wisconsin "55". TR_1 genotypes were susceptible and accessions 700 and 915 resistant to a second race of blight, T_1. There is some evidence that accession 700 carries one or more genes similar in action to but distinct from TR_1.

2497 **The effect of *Cladosporium* leaf mould on tomato yield.**
Scot. Agric. 1954–55 : **34** : 172–73.

In a trial at Auchincruive, seven tomato varieties susceptible to *Cladosporium fulvum* and seven immune varieties gave similar yields during the first half of the cropping season; during the second half, when the disease became prevalent, the immune varieties averaged 71% higher yield than susceptible varieties.

2498 **Report on the work of the West of Scotland Agricultural College, for the year ended 30th September, 1954** : Pp. 61.

High-yielding selections immune from *Cladosporium* leaf mould have been obtained from hybrids involving *Lycopersicon peruvianum* in their parentage. The selections are not yet sufficiently uniform to be released for trial.

2499 MEURMAN, O.
Avomaan tomaattilajikkeista. **(Outdoor tomato varieties).**
Koetoim. ja Käytäntö 1954 : p. 10.

An account is given of experiments in Finland with various imported tomato varieties. Although some of these give apparently good yields, the proportion of ripe tomatoes is less satisfactory and the old established variety referred to as Bonner Best remains the best for Finnish conditions. Early Chatham is a good runner-up.

2500 SINGH, H. B. & SIKKA, S. M.
Pusa Makhmali, a new find in lady's fingers.
Indian Fmg. 1955 : **4** : No. 11 : 27–29.

Pusa Makhmali, a new variety from West Bengal, has proved superior to all native and introduced varieties under conditions in New Delhi. It produces a high yield of straight, green, five-ridged pods six to eight inches long and may be grown either as a summer or as a monsoon crop.

2501 **Seed bulletin. Pulse.**
IVRO, Wageningen 1954 : Pp. 8.

Descriptions are given of the principal varieties of round blue peas, round yellow peas, grey peas, maple peas, field beans and tick beans recommended for cultivation in the Netherlands in 1954 (cf. *PBA*, Vol. XXIV, Absts. 2556, 2562 and 2581).

2502 Landbouwstambonen, 1955. **(Field French beans, 1955).**
Landbouwvoorlichting 12 : Bijl. 4; Ber. Rassenkeuze 1955 : No. 184 : unpaginated.

Data on yield, quality and degree of resistance to diseases and pests are given for the principal varieties of brown, yellow and white haricot beans grown in the Netherlands. In trials conducted in 1954, Beka gave the most consistently high yields on all types of soil.

2503 KRISHNASWAMI, D. & KRISHNASWAMY, N.
Subterranean cleistogamy in *Phaseolus calcaratus*, Roxb.
Curr. Sci. 1955 : **24** : 54–55.

Subterranean flowers and pods resembling those borne on aerial shoots have been found on *Ph. calcaratus* in India. It is suggested that, should this character prove to be heritable, the species may be of use as a pasture plant.

2504 INOUE, Y. & SUZUKI, Y.
(Studies on the reproductive physiology of the French bean. III. On artificial hybridization).
Engeigaku Kai Zasshi/J. hort. Ass. Japan 1954 : **23** : 79–81. [Japanese].

The optimum time for emasculating the variety Masterpiece is three days before flowering;

pollination should follow within 24 hr., preferably in the morning.

2505 Sneddon, J. L. & Squibbs, F. L.
A description of climbing French bean varieties grown in the United Kingdom.
J. nat. Inst. agric. Bot. 1954 : **7** : 121–30.

Twenty-five climbing varieties of *Phaseolus vulgaris*, classified into 15 types distinguished chiefly by differences in seed and pod characters, are described. A key to identification and a photograph of the seeds are included.

2506 Vargas S., R.
Variedades nacionales de frijol en la costa central. (**National varieties of French bean in the Central Coastal Area**).
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1953 : **3** : No. 4 : 26–29.

Observations were made on ten varieties of *Phaseolus vulgaris* which are being tested in Peru. Data are presented on yield, morphological characters, disease resistance and composition, vitamin quality and cooking quality of the beans. The variety Caraotas from Venezuela was the most resistant to pests and fungous diseases.

2507 **Anthracnose of beans.**
Agric. Gaz. NSW 1954 : **65** : p. 431.

Two strains of *Colletotrichum lindemuthianum* occur in New South Wales, many commercial varieties being susceptible to both strains. Individual plant selection has resulted in a line of Brown Beauty with 100% resistance to strain 1, the more widely distributed strain. Promising lines resistant to both strains have been obtained from crosses between resistant but commercially undesirable varieties and susceptible beans of the desired type; resistance to rust is also receiving attention in making such crosses.

2508 Quantz, L.
Ein Ringfleckenvirus von Buschbohnen. (**A ring-spot virus of dwarf French beans**).
Phytopath. Z. 1955 : **23** : 209–20.

A new virus disease of French beans, discovered recently in the Lüneberger Heide, Western Germany, is described. Infected plants are stunted and have deformed, curled leaves with grey or reddish-brown necrotic spots up to 1 mm. in diameter. None of the 59 varieties tested at the Institute for Virus Research on crop Plants, Brunswick, was resistant to the virus, although some varieties suffered more severely than others. Serological tests suggested that the new virus was closely akin to the potato ring-spot virus. It could also be transferred to tobacco, tomato, *Datura stramonium* and various leguminous crops.

2509 Rudorf, W.
Die Übertragung der Resistenz gegen die Bohnenmosaik-Viren 1 (gewöhnliches Bohnenmosaik) und 2 (gelbes Bohnenmosaik) aus *Phaseolus coccineus* in fertile Bastardpflanzen aus der Kreuzung *Phaseolus vulgaris* x *Phaseolus coccineus*. [**The transference of resistance to bean-mosaic viruses 1 (common bean-mosaic) and 2 (yellow bean-mosaic) to fertile hybrid plants from the cross *Ph. vulgaris* x *Ph. coccineus***].
Naturwissenschaften 1955 : **42** : 19–20.

The resistance of *Ph. coccineus* to viruses 1 and 2 of bean mosaic was successfully transferred to the varieties Weisse Riesen [White Giant] and Rote Prunk [Red Splendour] in crosses effected at the Max Planck Institute for Breeding Research, Voldagsen, Germany. The majority of the plants in the F_1, most of which were susceptible, proved highly sterile. Highly fertile and completely immune F_4 and F_5 lines were obtained, however, and investigations on the genetical basis of inheritance of resistance are in progress.

2510 Brown, H. D., Peters, G. & Gould, W. A.
Evaluation of Lima bean varieties for dehydration.
Res. Bull. Ohio agric. Exp. Sta. 1954 : No. 751 : Pp. 13.

Twelve varieties were evaluated for their quality as green shelled beans and suitability for dehydration. Fordhook 242, Concentrated Fordhook, Peerless and Early Thorogreen were found to be satisfactory with respect to colour, flavour and texture when reconstituted after dehydration.

2511 Hartwig, E. E.
The new varieties for the southern states.
Soybean Dig. 1954 : **14** : No. 12 : 8–9.

Soya bean varieties recently released in the southern USA are discussed.

2512 **Two new varieties for the north. Norchief and Chippewa promise early maturity.**
Soybean Dig. 1954 : **15** : No. 1 : 16–17.

The new soya bean varieties Norchief (Flambeau x Hawkeye) and Chippewa [(Lincoln x Richland) x Lincoln] are to be released in 1955 in Wisconsin, Minnesota, Michigan and Ontario; the latter variety is also to be released in South Dakota and Ohio. Norchief is expected to be particularly useful in areas where Mandarin (Ottawa) and Capital are too late and where Flambeau is too early. It is superior to Flambeau in yield, to Flambeau and Capital in lodging resistance and to Mandarin and Flambeau in oil content. Maturing approximately five days earlier than Blackhawk, Chippewa equals this variety in yield and oil content but is superior in lodging resistance. Both varieties bear yellow seed with a black hilum.

2513 Rubcova, V. V.
(**Cultivating the soya bean in western Siberia**).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1954 : No. 17 : 89–90. [Russian].

The results of trials conducted at Novosibirsk are presented; some of the varieties tested gave high yields and proved resistant to drought and frost. Amurskaja Želtaja [Yellow Amur] and Rekord Severnyĭ [Northern Record], both from the Amur Breeding Station, a number of new varieties bred at Habarovsk, and direct and reciprocal crosses between Kubanj 4958 and Rekord Severnyĭ had growth periods of less than 100 days and were thus able to mature before the advent of the frosts.

2514 Fukui, J. & Ono, H.
(**Ecological studies of soya bean varieties in Japan. II. Relations between varietal ecotype and various characters**).
Kanto Tosan Nogyo Shikenjo Kenkyu Hokoku/J. Kanto-Tosan agric. Exp. Sta. 1952 : No. 3 : 49–73. [Japanese].

Tabulated descriptions are given of the vegetative period, dimensions of the stems, branches and nodes, number and weight of pods and seeds, and botanical characteristics of the leaves, flowers, seeds and indumentum for 204 varieties of Japanese, Korean, Manchurian and American provenance. In general, the size of the vegetative parts was correlated with the length of the vegetative period.

2515 Takeshima, H.
(**On the effects of high temperature and short day treatments on the early stages of growth in the soya bean**).
Yamagata Daigaku Kiyo (Nogaku)/Bull. Yamagata Univ. (Agric. Sci.) 1954 : **1** : 346–52. [Japanese].

The effects of (1) high temperature, (2) short photoperiods and (3) a combination of these treatments on the vegetative period of nine varieties were investigated. In general, high temperature induced the greatest acceleration in development in the case of the summer varieties; conversely the development of the autumn varieties was accelerated by short day treatment to a greater extent than in the summer forms.

2516 Kato, I. & Sakaguchi, S.
(**Studies on the mechanism of development of abortive grains in the soya bean and on the prevention of their occurrence**).
Tokai Kinki Nogyo Shikenjo Kenkyu Hokoku/Bull. Div. Pl. Breed. Cult. Tokai-Kinki agric. Exp. Sta. 1954 : No. 1 : 115–27. [Japanese].

During the course of investigations on the ontogeny of the various types of seed abortion in the soya bean, observations were made on varietal differences in the frequency of abortion, the size of the aborted seeds and their serial position within the pod.

2517 Kato, I., Sakaguchi, S. & Naito, Y.
(**The mode of development of the floral organs and seed in soya beans**).
Tokai Kinki Nogyo Shikenjo Kenkyu Hokoku/Bull. Div. Pl. Breed. Cult. Tokai-Kinki agric. Exp. Sta. 1954 : No. 1 : 96–114. [Japanese].

In the course of this report on investigations into the embryology of the soya bean, varietal differences in the number of ovules per ovary are recorded; the figure ranged from 1 to 4.

2518 Mackiewicz, Z.
Porównanie odmian soi w latach 1947–51 w Bydgoszczy i Minikowie. (**The comparison of soya bean varieties during the years 1947-51 at Bydgoszcz and Minikowo**).
Roczn. Nauk rol. 1954 : **69** : Ser. A. : 292–94.

In trials of 11 varieties of soya bean, including seven of Polish origin, at the Bydgoszcz Institute of Agriculture, Manuring and Soil Science and at the Minikowo Research Station, the best as regards yields of seed, protein and oil were Dieckmanna 2143 [Dieckmann 2143], Dieckmanna Heimkraft [Dieckmann Home Strength] and Złotka [Golden], their oil contents ranging from 19 to 20%. Their long vegetative period is a disadvantage, but they are suitable for cultivation in western and south-western parts of Poland.

Of the earlier varieties, the best were Giessenka 71, Bydgoska 030 and Bursztynowa 027 [Amber 027], the last having an oil content of 17·7%. The earliest variety was ZM034 which showed markedly higher contents of protein and oil and a somewhat higher seed yield than the two lowest yielding early varieties. The varieties SWHN żolta [Yellow SWHN], Datnowska żolta [Yellow Datnowska] and Puławska wczesna [Puławy Early] are susceptible to virus diseases.

2519 HAUMAN, L.
Contribution a l'étude des *Papilionaceae-Phaseoleae* du Congo Belge et du Ruanda-Urundi. (**Contribution to the study of the Papilionaceae-Phaseoleae of the Belgian Congo and Ruanda-Urundi**).
Bull. Jard. bot. Brux. 1955 : **25** : 93–125.

Among the new species and varieties described are *Glycine upembae*, *G. javanica* var. *paniculata*, *G. schliebenii* var. *rufescens* and *G. schliebenii* var. *enneaneura*.

2520 WADDLE, B. A.
An evaluation of the components of yield in a cross between two diverse types of soybeans.
Diss. Abstr. 1954 : **14** : Publ. No. 9385 : 2174–75.

The progenies of a cross between Lincoln and Purdue Acc. 2300–2 were studied with respect to yield, various components of yield and other characters. Yield was considered to be the product of four components: (1) number of nodes with pods, (2) number of pods per node, (3) number of seeds per pod and (4) average weight per seed. The genotype of Lincoln for colour of the flower, pubescence, hilum and pod, and for growth habit and hilum size is $ww\ TT\ R_1R_1\ LL\ DtDt\ MiMi$, that of Acc. 2300–2 $WW\ tt\ r_1r_1\ ll\ dtdt\ mimi$. The occurrence of the gene pair *Mimi* for normal-sized *vs.* minute hilum is reported for the first time.

Heritability estimates for the yield components indicated above and for yield were 9·7%, 29·5%, 7·1%, 45·5% and 1·8% respectively for a drilled test, and 3·7%, 19·5%, 9·4%, 42·6% and 5·7% respectively for a spaced test. It was concluded that the marked differences in yield and the components of yield among the F_2 progenies were largely due to genetic disparities in growth type and maturity date. Differences in plant height and date of maturity were therefore more efficient in predicting the performance of F_3 progenies than yield itself or any of the components of yield.

2521 MATSUMOTO, S. & KUROSAWA, T.
(**On intervarietal differences in the number of soya-bean seeds damaged by *Grapholitha glycinivorella***).
Hokkaido Nogyo Shikenjo Iho/Res. Bull. Hokkaido agric. Exp. Sta. 1954 : No. 67 : 18–27. [Japanese].

A comparative study on the reaction of 20 Japanese varieties to infection by the above pest is presented. In pubescent varieties, eggs are usually laid on the pods; in glabrous varieties they mostly occur elsewhere on the plant. Among the pubescent varieties, a correlation was noted between pod length during the period of penetration and the number of infested seeds.

2522 BINGEFORS, S. & JÖNSSON, A.
Kok- och foderärtsorter för södra och mellersta Sverige. (**Cooking peas and fodder peas for central and southern Sweden**).
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : 16–21.

Tabulated data on the comparative yields of the varieties most widely grown in central and southern Sweden are provided and recommendations are made as to the most suitable varieties for cultivation in the different regions.

2523 Capucijners en rozijnerwten, 1955. (**Grey peas and maple peas, 1955**).
Landbouwvoorlichting 11 : Bijl. 25 ; Ber. Rassenkeuze 1954 : No. 177 : unpaginated.

Data on yield, growth habit, suitability for mechanical harvesting, disease resistance, size of pea and eating quality are presented for two varieties of grey pea and four varieties of maple pea grown in the Netherlands.

2524 BINGEFORS, S. & JÖNSSON, A.
Våra nuvarande kok- och foderärtsorter i belysning av försök utförda i södra och mellersta Sverige. (**Our present varieties of cooking and fodder peas in the light of trials conducted in southern and central Sweden**).
Sverig. Utsädesfören. Tidskr. 1954 : **64** : 283–308.

The results of field trials of the cooking varieties Torsdags III [Thursday III], Kloster [Cloister], Stràl [Ray] and Concordia and of the fodder peas Brio, Parvus and Hero are reported up to 1952.

Torsdags III was markedly outyielded by both Strål and the late variety Kloster in the south, but in other areas the differences between the varieties were slight. Kloster has the best

cooking quality. Concordia was later than the other varieties and of greater seed size and dry weight but gave the lowest yield.
In most districts Brio was superior in seed yield to Parvus and Hero, with the former its equal in the south and the latter its equal in the Mälaren and Hjälmaren regions. Hero had the highest dry weight and Parvus the smallest seed.

2525 MANNER, R.
Hammenhögs foderärt Valör. (**The Hammenhög field pea Valör**).
Våren 1955. Hammenhögs, Otto J. Olson & Sons AB : 9–12.

Valör [Value], formerly known as Hammenhög–0121, was derived from the cross Solo x NIII, the latter parent being a type from Ernst Nilsson's pea material for theoretical research. In Swedish official tests and in trials at Gullåker the new variety came within the Solo class as regards green forage yield, while its seed production was better and at least equal in general to that of Hero, Parvus and Brio; it can therefore be recommended for testing in practical farming. Its seeds, which are greenish blue with a brown or lilac tinge, are smaller than those of Brio and, in the Hammenhög trials, than those of Solo and Hero too, but larger than those of Parvus. In southern Sweden it flowers and ripens relatively early.

2526 WIKLUND, K.
Svalöfs original Nolaärt II. (**The Svalöf original pea Nola II**).
Allmänna Svenska Utsädesaktiebolaget, Svalöf 1955 : 21–23.

Nola II (Å05323), a new variety of pea for mixed sowings, is described. Designed to replace Nola I, it matures earlier and is more productive than its sister variety. In recent trials in northern and central Norrland it also outyielded Vesta.

2527 DE HAAN, H.
The breeding of peas in the Netherlands. 1. Round blue peas.
Euphytica, Wageningen 1954 : **3** : 188–94.

Early and more recent breeding of round blue peas in the Netherlands is surveyed. At the Hoofddorp station considerable progress has been achieved in developing varieties resistant to *Fusarium solani* and *F. oxysporum* f. *pisi*. Information on the relationships between the varieties bred, changes in varietal acreages during the period 1933–53 and on seed production is also provided.

2528 Ronde groene erwten, 1955. (**Round blue peas, 1955**).
Landbouwvoorlichting 11 : Bijl. 23; Ber. Rassenkeuze 1954 : No. 175 : unpaginated.

Data on yield, quality and resistance to diseases and lodging are presented for the eight varieties most widely grown in the Netherlands. Rondo CB and Servo gave the highest consistent yields on alluvial soils but, on marine clay soils, Servo proved the more productive of the two. Good yields were also obtained from Virtus and Vares.

2529 Schokkers, 1955. (**Marrowfats, 1955**).
Landbouwvoorlichting 11 : Bijl. 24; Ber. Rassenkeuze 1954 : No. 176 : unpaginated.

Brief descriptions of Zelka, Emigrant and Big Ben are given, together with details of their performances in yield trials on different types of soil in the Netherlands.

2530 Gele erwten, 1955. (**Yellow peas, 1955**).
Landbouwvoorlichting 11 : Bijl. 26; Ber. Rassenkeuze 1954 : No. 178 : unpaginated.

In trials conducted in the Netherlands in 1954, Dippe's gele Viktoria [Dippe's Yellow Victoria] outyielded Mahndorfer frühe gelbe Viktoria [Mahndorf Early Yellow Victoria]. Both these varieties produced considerably less than the round blue peas Servo and Rondo CB.

2531 **New blackeye pea developed in state.**
Arkans. Fm. Res. 1954 : **3** : No. **4** : unpaginated.

The high-yielding selection Ark. 53–1, expected to be released in 1955, grows approximately 24 inches high, bearing pods 7–8 ins. long on erect stems. The selection sets its entire crop within a period of 15 to 24 days. The peas show the typical pattern of the blackeye type. The variety is not suitable for combine harvesting as a dry pea since it shatters badly when harvested at this stage.

2532 LAMPRECHT, H.
Weitere Studien über die Vererbung der Hülsenbreite bei *Pisum*. (**Further studies on the inheritance of pod width in *Pisum***).
Agri hort. genet., Landskrona 1954 : **12** : 202–10.

The results of previous studies on the recessive gene te_1 for narrow pods are given (cf. *PBA*, Vol. XXIII, Abst. 3118); these findings have been confirmed by data obtained from a further cross, involving lines 96 and 982. The existence of an additional gene, *Laf* (*latum facere*) is postulated, which, in a dominant condition, accentuates the effect of *Te* on pod width. The F_2 of line 96 x line 982 displayed incomplete dominance of broad over narrow pod. The gene *Laf*, which is closely linked with *Te*, *Cp* and *Gp*, appears to lie in chromosome V in close proximity to *Te*.

2533 LAMPRECHT, H.
Zur Kenntnis der Chromosomenstruktur von *Pisum*. Eine Übersicht und ein neuer Fall, mit chromosomal bedingter Ausspaltung von sterilen Zwergen. (**On our knowledge of the chromosome structure of *Pisum*. A review, and a new case of segregation of sterile dwarfs conditioned by chromosomes**).
Agri hort. genet., Landskrona 1954 : **12** : 121–49.

Hitherto reported cases of partial or complete sterility in crosses between different lines of *Pisum sativum* are subjected to a critical review and methods of determining the chromosome structure of the species are surveyed. In recent experiments line 582, which contains the gene sequence *Le–A–B–U–Gp–St–Wb* and when crossed with ordinary peas has given F_1 progenies that were up to 75% sterile, was crossed with line 1072 (*Le–A–b–*U_{st}*–gp–st–wb*), which has given completely fertile progenies in crosses with ordinary peas. The F_1 of this cross was 50·97% fertile, but in the F_2 92 dwarfs, with an average height of 10–12 cm., were found in a total of 459 plants. The dwarfs were deformed, many died at an early stage of growth, and some of the plants that matured proved sterile. This effect is attributed to a deficiency. In the F_3 and F_4, the dwarfs segregated as monogenic recessives. The results of the cross between lines 582 and 1072 suggest the existence of a second type of interchange between chromosomes III and V. In previous cases the order of the three genes of chromosome III/V was *Gp–St–B* (cf. *PBA*, Vol. XXIV, Abst. 1593); here it would appear to be *St–B–Gp*.

2534 LAMPRECHT, H.
Die Koppelung des Gens *Wsp* und die Genenkarte von Chromosom VII von *Pisum*. (**The linkage of the gene *Wsp* and the gene map of chromosome VII of *Pisum***).
Agri hort. genet., Landskrona 1954 : **12** : 115–20.

The author recalls that, in 1939, he reported the discovery of the gene *Wsp*, which in a dominant condition determines the deposition of wax on both the upper and lower surfaces of the leaves. Plants with *wsp* have wax on the upper surface of the leaf only (cf. *PBA*, Vol. X, Abst. 256). In the present series of experiments, crosses were carried out between plants containing *Wsp* and others containing *wsp*; segregation in the F_2 was in an approximately 3 : 1 ratio and *Wsp* was shown to lie in chromosome VII. The order of genes in this chromosome is now postulated as being *Wsp–R–Tl–Pa–Bt*.

2535 CAROLI, G. & BLIXT, S.
Cytological verification of the genanalytically proved interchange between the chromosomes III and V of *Pisum*.
Agri hort. genet., Landskrona 1954 : **12** : 107–14.

Cytological measurements of the lengths of the seven chromosomes of *P. sativum* (cf. *PBA*, Vol. XXIV, Abstr. 1593) substantiated Lamprecht's findings (cf. *PBA*, Vol. XXIV, Abstr. 2575) that interchange had occurred between chromosomes I and VII of line 379. The long arm of chromosome I had become 1·4μ shorter and the short arm of chromosome VII correspondingly longer. The chromosomes designated I and VII in these experiments are identical with those referred to by Lamprecht as chromosomes III and V, respectively.

2536 MORRISON, J. W. & LIN, S.-L.
Chromosomes and nucleoli in *Pisum sativum*.
Nature, Lond. 1955 : **175** : 343–44.

An ideogram of the chromosomes of *P. sativum* ($2n = 14$) is presented as the result of an examination of root-tip mitosis. Usually one or two nucleoli were observed, and occasionally three or four. Two pairs of the chromosomes had nucleolar constrictions, each member of either of these two pairs having a couple of satellites on the long arm. During meiosis the maximum number of nucleoli per nucleus was two; at telophase, bodies resembling nucleoli but not associated with specific loci were observed.

2537 ZANNERIO, C.
Il pisello che si vende nel cuore dell' inverno. (**The pea that is sold in the heart of winter**).
G. Agric. Domen. 1955 : **65** : p. 62.

Reference is made to the peas of Torre Annunziata in Italy, which ripen from November onwards. They exist in two varieties, the white and the green, the former being regarded as the better in quality.

2538 Nilsson, E.
Baljfärgen hos ärter och dess betydelse för bruksvaran. (**Pod colour in peas and its importance for the commercial product**).
Svensk JordbrForsk. Årsb. 1954 : 140–44.

A study was made in 1952 and 1953 by Swedish investigators on the effect of the gene pair *Pa pa* (primarily determining light and dark green pods respectively) on the colour shades of the seeds, pods and colyledons of green peas. In both pod and seed, colour differences between *pa* and *Pa* lines were noted. There is also evidence that pod colour is modifiable by environment as well as genetically determined. Observations also showed that apparently it is mainly the colour of the unripe seed coat that determines the seed colour as a whole, though in one case the lighter colour of the pod was also evident in the cotyledons.

In breeding garden and marrowfat peas *pa* plants should normally be used, as they yield a superior market product, whether sold shelled or unshelled.

On cooking, *Pa* and *pa* pods showed practically no difference in colour and the cooked seeds showed very little.

Another gene pair, *I* for yellow seed-colour at maturity, and its allelomorph *i* for green ripe seeds, is mentioned as one of several seed-colour genes worth investigation.

Knoblauch's tests of 17 marrowfat varieties in Denmark (cf. *PBA*, Vol. XXIV, Abst. 1532) are cited as further evidence from which the favourable effect of *pa* and the unfavourable effect of *Pa* in varieties subjected to deep freezing may be deduced.

2539 Wallen, V. R. & Stolko, A. J.
Physiological specialization in *Ascochyta pisi* Lib.
Proc. Canad. phytopath. Soc. 1954 : No. 22 : p. 18. (Abst.).

The use of a range of differential pea hosts has enabled four distinct forms of *A. pisi* to be recognized in Canada, form 1 being prevalent in western Ontario, 2 and 3 in the Ottawa region and 4 in the eastern provinces and Manitoba.

2540 Khan Sardar Khan
C 612—a new variety of gram (*Cicer arietinum*) for the Punjab (Pakistan).
Agriculture, Pakistan 1953 : **4** : 157–62.

The wilt-resistant variety C612, developed from the cross F8 x C144, has given a promising performance in trials in several districts. It is high yielding and equal to C12/34 in quality.

2541 Hashioka, Y. & Suzuki, Y.
Strains of *Sclerotinia trifoliorum* and certain cultural conditions relating to the severity of the Sclerotinia rot of Chinese milk vetch.
Gifu Daigaku Nogakubu Kenkyu Hokoku/Res. Bull. Fac. Agric. Gifu Univ. 1954 : No. **3** : 1–12.

Two pathogens responsible for snow mould of *Astragalus sinicus* were investigated: *S. trifoliorum* and a species of *Pythium*. Differences in the growth rate *in vitro* of nearly 100 strains of *S. trifoliorum* collected throughout Japan were discovered. There was a general correspondence between growth rate and pathogenicity against *A. sinicus*. Varieties of this crop appeared to differ little in degree of susceptibility to *S. trifoliorum*.

In the case of the *Pythium* sp., it was noted that northern Japanese varieties of *A. sinicus* were more resistant to attack than southern forms.

2542 Linnert, G.
Die Struktur der Pachytänchromosomen in Euchromatin und Heterochromatin und ihre Auswirkung auf die Chiasmabildung bei *Salvia*-Arten. (**The structure of the chromosomes at pachytene with respect to euchromatin and heterochromatin and its effect on chiasma formation in *Salvia* species**).
Chromosoma 1955 : **7** : 90–128.

The results of recent research at the Botanical Institute of Freiburg University and at the Institute for Research on Heredity and Breeding, Berlin-Charlottenburg, on the morphological structure and behaviour during meiosis of the chromosomes of eleven species of *Salvia* are reported. The following observations were made: (1) In *S. horminum*, the heterochromatin was concentrated at the centromeres and chiasma frequency was low; in *S. glutinosa*, the heterochromatin was distributed along the length of the chromosomes and chiasma frequency was high. The other nine species examined were intermediate in these respects between *S. horminum* and *S. glutinosa*. (2) In *S. horminum* the euchromatin is in the form of a spiralized chromonema, completely lacking chromomeres. (3) In *S. nemorosa*, the heterochromatic zone is a thick thread with occasional thinner regions. Both the euchromatic and the heterochromatic regions are loosely spiralized.

2543 MECHELKE, F.
Die Chromosomenzahlen von Thymian und Bohnenkraut. (**The chromosome numbers of thyme and savory**).
Kulturpflanze, Berlin 1954 : **2** : 143–44.

The results of caryological studies at the Institute for Research on Crop Plants, Gatersleben, Germany, are reported. In *Thymus vulgaris*, $2n = 30$; the chromosomes are almost identical in size and shape. In *Satureja hortensis*, $2n = 48$; a primary chromosome number of $x = 12$ or 6 is postulated.

2544 TSUDA, C.
(**Cytological studies on *Mentha* plants. I**).
Ikushugaku Zasshi/Jap. J. Breeding 1954 : **3** : Nos. 3–4 : 7–14. [Japanese].

Meiosis was studied in *M. rotundifolia* ($2n = 24$). At diakinesis, 1–5 quadrivalents were observed; at metaphase I, in addition to the chromosome associations expected from the diakinesis groupings, additional associations, believed to be due to residual attraction, were also noted.

2545 IKEDA, N. & UDO, S.
(**Studies on mint breeding. II. Phylogenetic studies on *Mentha* in the light of caryological considerations**).
Okayama Daigaku Nogakubu Gakujutsu Hokoku/Sci. Rep. Fac. Agric. Okayama Univ. 1954 : No. 4 : 43–49. [Japanese].

The following somatic chromosome numbers are reported: *M. arvensis*, 96; *M. gentilis*, 72 and 96; *M. japonica*, 48; *M. piperita*, 72; *M. pulegium*, 48; *M. rotundifolia*, 24; and *M. spicata*, 36, 48 and 54. Forms with either 36 or 72 chromosomes were sterile.

2546 IKEDA, N. & KONISHI, T.
(**Studies on mint breeding. III. Artificial polyploids of Japanese mint**).
Okayama Daigaku Nogakubu Gakujutsu Hokoku/Sci. Rep. Fac. Agric. Okayama Univ. 1954 : No. 5 : 1–9. [Japanese].

Polyploids with $2n = 192$ chromosomes were obtained by colchicine treatment of Japanese mint varieties ($2n = 96$). The polyploids germinated more slowly than the parental forms and the polyploid pollen appeared octagonal under the microscope in contrast to the hexagonal appearance of the original strains. The polyploids had a higher essential oil content and a higher percentage of menthol in the oil than the parental material, but in neither case were the values as great as those found in some commercial varieties.

At metaphase, 8–14 quadrivalents were observed in the polyploids; chromosome segregation proceeded regularly but fertility was somewhat reduced.

BOOK REVIEWS

RIEGER, R. & MICHAELIS, A.
Genetisches und cytogenetisches Wörterbuch. (**Genetical and cytogenetical dictionary**).
Züchter 1954 : 2. Sonderheft : DM 23,50 : Pp. 140 : diagrams, figs.

To the best of our knowledge this Sonderheft constitutes the first dictionary of genetics to have appeared in the German language and it is likely to become a standard reference work for all those engaged on the subject. Apart from Knight's *Dictionary of Genetics* (cf. *PBA*, Vol. XIX, p. 427), there has been a considerable dearth of suitable reference books on the subject and this publication should go a considerable way to remedying the lacuna. A wide range of genetical and cytological terms—some 2500 in all—has been assembled and the authors are to be congratulated on the meticulous care which they have obviously devoted to their highly factual expositions, numerous illustrations and diagrams adding to the clarity of the explanations given in the text. In a science such as genetics, in which new terms and conceptions are being constantly evolved, numerous difficulties are bound to arise in compiling a dictionary of this kind, which can never claim to be completely up to date. In addition, of course, there is no complete unanimity even among geneticists themselves as to the correct terms to be employed and, as a result, considerable confusion often ensues. The authors, aware of these pitfalls, have gone some way to avoiding any such discrepancies by referring back, in the case of newly invented expressions or expressions of doubtful connotation, to the author who has coined them and by giving the title and date of the work in which these terms have occurred. In addition to German genetical terms, many English genetical expressions are explained and, in cases in which the German word is a loan translation from the English, the English form is also given, e.g. Abstossungshypothese (Repulsion Hypothesis).

This work may be recommended without reservation. One might, however, suggest that the dictionary be published in book form in its own right and not be relegated to the subsidiary position of a Sonderheft.

L'Héritier, P.
Traité de génétique. II. La génétique des populations. (**Treatise on genetics. II. Population genetics**).
Presses Universitaires de France, Paris 1954 : 900 fr. : 345–515 : 16 figs. : 9 tables.

Professor L'Héritier was one of the first French exponents of the mathematic theory of population genetics; his *Analyse de quelques études mathématiques sur la sélection naturelle* was published twenty years ago and was reviewed in *PBA*, Vol. V, p. 167.

The present volume is in the nature of an introductory survey of the present mathematical theory, and closely follows the standard treatment by Haldane, Fisher and Wright. The exposition appears to be intended for the non-specialist reader but the mathematics involved will provide stiff going for many biologists. The book is divided into three sections. The first develops the concept of panmixia and the Hardy-Weinberg Law, and passes on to a consideration of the effect of different mating systems and the significance of inbreeding coefficients. The second section is devoted to the effects of gametic and zygotic selection on population structure, the role of mutation and immigration, and the relation between population size, selection, and genetic drift. In the final section, the neo-Darwinian model of evolutionary development is expounded and an account is given of the attempts made, notably by Mayr (cf. *PBA*, Vol. XIII, p. 378), to devise a genetical definition of the species.

French readers will undoubtedly welcome an introductory account of an admittedly difficult subject in their own language. Professor L'Héritier does not pretend that all biologists are convinced that the abstract models devised by the population geneticists correspond exactly with the intricacies of real life. On the other hand, he could possibly have indicated that the genetical "species" only corresponds occasionally with the taxonomic species, and his discussion of the validity of extrapolating from the data of population genetics to the entire paleontological record hardly deals adequately with the obvious difficulties.

Buzzati-Traverso, A. A. (Editor)
Symposium on genetics of population structure, Pavia, Italy, August 20-23, 1953.
Publ. Internat. Un. Biol. Sci., Naples 1954 : Ser. B. : No. 15 : Pp. 141 : figs. : tables : 1 plate.

This symposium was held in conjunction with the ninth International Congress of Genetics. As A. A. Buzzati-Traverso points out in his introductory note, the symposium was deliberately restricted to relevant aspects of polygenic inheritance. Most of the contributions are concerned with the population genetics of *Drosophila*. Describing experiments on selection for abdominal chaetae, G. Clayton, J. A. Morris and A. Robertson show that large amounts of genetic variability may persist after many generations of selection. In Asymmetrical response in selection experiments, D. S. Falconer describes differences in the rates of response to selection in opposite directions in mice. Asymmetry may result from unequal initial frequencies of genes and directional dominance; many characters may therefore be expected to show an asymmetrical response; it is suggested that the practical consequences of this conclusion may be important since predicted rates of progress based on heritability values may be overestimations of the rate of progress of selection in the upward direction. R. E. Scossiroli gives an account of experiments showing that X irradiation releases variability in selected lines which have reached the limit of their response to selection; such increased variability may be mainly due to mutation in polygenic systems. B. Wallace discusses Coadaptation and the gene arrangements of *Drosophila melanogaster*. In the discussion following this paper, Th. Dobzhansky commented upon some trends in population genetics and in evolutionary studies and I. M. Lerner on the current status of population genetics, both pointing to the radical necessity of considering polygenic blocks and other complexes as the significant entities in evolutionary processes rather than the classical single genes; B. Wallace added an outline of the results of genetic analyses of irradiated populations of *Drosophila* and the light they throw on the organization of the gene pool. J. Clausen contributes The ecological race as a variable biotype compound in dynamic balance with its environment, describing genetic systems within races of *Potentilla glandulosa* and variation among biotypes of *Achillea*. H. Lewis considers Quantitative variation in wild genotypes of *Clarkia*, referring to quantitative variation in chromosome complements in this genus, several species of which contain extra chromosomes arising through duplication; the accession of additional chromosomes appears to be associated with the spread to new habitats which are more arid than those occupied by the parental types. Contributing some remarks on this paper, C. Epling suggests that the observations of Lewis are better interpreted according to the concept of polygenic interaction rather than in terms of quantitative variation in genetic material. Summing up, A. A. Buzzati-Traverso endorses the view expressed earlier in the symposium by Lerner that the discipline of population genetics has reached a critical stage since the mathematical models which have provided the basis for the Mendelian interpretation of quantitative inheritance and for modern evolutionary theories may no longer be considered as adequate in accounting for a number of the results recently obtained in investigations on the genetic structure of natural and artificial populations and in the analysis of selection experiments. He also agrees with Lerner that it is essential to clarify the genetic terminology employed, giving several examples of inconsistencies revealed in the discussions. Buzzati-Traverso also points out that new concepts of the genotype and phenotype are emerging as the result of selection experiments; beyond a certain threshold of inbreeding the classical relationship between homozygosis and variability may not hold. Recent developments in the study of population genetics and of artificial selection may offer a fresh approach to the problem of the nature of the gene; the synthesis of lethal and semilethal genes as the result of crossing over of chromosomes in *Drosophila* is of particular significance in this connexion. The artificial induction of mutations in polygenic systems has as yet received little attention. Other subjects requiring investigation include population size as a factor in selection experiments, the relationships between artificial selection for a desired trait and the opposing effects of natural selection, the connexion between genetic and developmental homeostasis, and the influence of genetic variability on the reproductive potential of a population. A brief closing address in a light vein was given by J. B. S. Haldane, who quoted Lucretius, Dante and the Archipoet to show that in their own humanistic terms they were not altogether unmindful of the problems of inheritance.

WEINER, J. S.
The Piltdown forgery.
Oxford University Press 1955 : 12s. 6d. :
Pp. xii + 214 : plates.

Science fiction we are already familiar with but fictitious science will doubtless come as something of a shock to many readers who had preserved their awed respect for the utterances of that very special category of *Homo sapiens* referred to in the popular press as "the" scientist. And that the sacrifice should be the Dawn Man of Piltdown himself merely aggravates the matter, for had not Piltdown man provided just that missing link that was required at the turn of the century to put the final stamp of authority on the Theory of Evolution? That Piltdown Man had become more of an embarrassment than an asset to the evolutionists affords but cold comfort when we find that with the recognition of Piltdown as a forgery not only the embarrassment but a small though important element of our faith in scientists—and hence in science—evaporates too.

The possibilities of the situation for producing a detective story of the "who-done-it" style have not been overlooked by the author, who however does not possess the skill of a Conan Doyle—who, incidentally, made several visits to Piltdown in 1912 and, we read, expressed excitement at the skull. In the attempt to unfold the story of the detection of the fraud in the manner of detective fiction the author makes concessions to scientific objectivity and though the tension is undoubtedly heightened to the extent that we are loth to put the volume down, we do so nevertheless with a feeling of dissatisfaction at the amount of rather unnecessary repetition and the essentially circumstantial nature of evidence on the identity of the actual perpetrator. One of the most fascinating things that emerges from the book is the picture of the genial atmosphere in which science was carried on in Edwardian times: apparently Mr. Dawson provided little or no precise evidence of how the finds were made yet his word was accepted by such distinguished figures as Sir Arthur Keith. Today with the aid of modern techniques of estimating fluorine, nitrogen, radioactive carbon and the like the whole Piltdown edifice, skull, Stegodon, hippo, flints and all, melt away as obvious artefacts, produced apparently with intent to deceive, by some still unidentified perpetrator with an uncanny combination of archeological knowledge and skill, a feeling for the psychology of the times, an uncommon degree of patience, audacity and—possibly most important of all—good luck. Or was it bad luck? We can but advise the inquisitive reader to read the book and decide for himself.

Bourne, G. H. & Danielli, J. F.
International Review of Cytology. Volume III.
Academic Press Inc., New York 1954 : $9.50 : Pp. 530 : figs. : tables.

The third volume of this useful series maintains the standard set by the earlier issues (cf. *PBA*, Vol. XXIV, p. 295) and covers a wide field of study. In The properties of urethan considered in relation to its action on mitosis, I. Cornman brings together and discusses the available information on a remarkable and versatile compound, the "accomplishments" of which are described as including capacities to act as a narcotic, mitotic poison, a carcinogen and a carcinoclast. A comparison of related compounds reveals that when further radicles are added to the urethane molecule inhibition of division, narcosis and toxicity gradually increase whereas carcinogenesis and carcinoclasis are properties limited to a few only of the carbamates. The effect of the urethane derivatives in inhibiting mitosis is thus regarded as purely narcotic and quite different from that of colchicine, which is potent in spite of its water solubility and seems to fit into no known series. M. Alfert writes on The composition and structure of giant chromosomes, dealing successively with recent advances in chromosome chemistry, the salivary gland type chromosome, the lampbrush chromosome and a comparison of both types and their relation to chromosome structure.

A. L. Dounce writes critically on The significance of enzyme studies on isolated cell nuclei and presents evidence showing that the nuclear membrane is permeable to ordinary organic molecules and even to protein molecules at least as large as those of hemoglobin. Differences in intranuclear metabolism and that in the aqueous phase of the cytoplasm are therefore perhaps limited to differences in bound or insoluble substrates such as DNA. The hypothesis of one-gene-one-protein is suggested in replacement of that of one-gene-one-enzyme.

A. G. Everson Pearse writes on Azo dye methods in enzyme histochemistry and O. Bucher on Caryometric studies of tissue cultures.

Chargaff, E. & Davidson, J. N. (Editors)
The Nucleic Acids. Chemistry and biology. Volume I.
Academic Press Inc., New York 1955 : $16.80 : Pp. xi + 692 : figs. : tables.

Those of our readers who are becoming more and more dissatisfied with vague notions such as genes as the bearers of inheritance will no doubt find comfort in this volume devoted to the nucleic acids, bodies which one day may come to supersede the "genes" in that characteristic function. Though much uncertainty still reigns concerning their exact composition, structure and function, the 626 pages of text of this book are packed with the results of precise analyses carried out by workers with test tubes, ultracentrifuges, absorption spectrophotometry, ion-exchange and paper chromatography, paper electrophoresis, electromicroscopes, X-ray diffraction and other advanced modern techniques. Most of the contributions are highly factual. A useful historical introduction is provided by the editors, there are chapters on the chemistry of ribose and deoxyribose, of purines and pyrimidines and of nucleosides and nucleotides, whereupon there follows a series of chapters dealing with the more modern techniques of estimation and isolation of the various constituents of nucleoproteins. In Evidence on the nature of the chemical bonds in nucleic acids by D. M. Brown and A. R. Todd we are told the most probable structure of the ribonucleic acids, which involves a recurring 3,5–phosphodiester linkage for the polynucleotide sequence, and reasons are stated for rejecting other possible structures. The available evidence suggests that some at least of the natural ribonucleic acids are based on branched-chain polynucleotides but the existence of linear chains too is not excluded. The deoxyribonucleic acids are at present regarded as unbranched. D. O. Jordan in The physical properties of nucleic acids discusses the various structures that have been suggested for nucleic acids and related compounds, the structure comprising two helical chains each coiled round the same axis, with the atoms in opposite sequence, being favoured as possessing the greatest degree of verisimilitude as far as the deoxypentose nucleic acids are concerned (cf. *PBA*, Vol. XXIV, Abst. 57). The optical properties of nucleic acids and their components are dealt with by G. H. Beaven, E. R. Holiday and E. A. Johnson and G. Schmidt writes on Nucleases and enzymes attacking nucleic acid components and shows that their behaviour conforms with that expected on the basis of the structure proposed by Brown and Todd. Separate charts are provided showing the absorption spectra of nucleic acid components. The volume is copiously documented and very full author and subject indexes are provided.

WOOD JONES, F.
Trends of life.
Edward Arnold & Co., London 1953 : 10s. 6d. : Pp. 191.

Professor Wood Jones has for many years been one of the most eminent critics of neo-Darwinism. In his latest book he presents a series of considerations in support of the view that the essence of life is "its power of self-maintenance which is manifested in activities that are characteristically directive." This view, which has both vitalist and Lamarckian implications, coincides in many respects with those of E. S. Russell whose position was reviewed in *PBA*, Vol. XVI, p. 108.

Biologists will be disappointed in that Professor Wood Jones has deliberately addressed himself to the general reader and eschewed the technicalities usually considered necessary to discuss the intricacies of the Lamarckian position. However, the author very rightly insists that "verbalism may well be said to be the vice of modern scientific literature," and he is bold enough to maintain that "there is little in the content of real science that cannot be made clear to the ordinary man in ordinary plain English." Also, he joins with contemporary philosophers in perceiving the pervasive effect of an inadequate technical language on the formulation of theoretical ideas. There can indeed be little doubt that one of the reasons why many current biological theories have gained acceptance is because the biological data on which they rest have been expressed in a terminology "borrowed from the vocabulary of the physicist."

Having justified his disuse of much in the way of technical terminology, Professor Wood Jones proceeds to outline the vitalist position, teleology, the theoretical significance of parallel and convergent evolution, adaptation to embryological conditions, the inheritance of adaptations and domestication. His treatment of these topics will undoubtedly irk the more combative neo-Darwinian reader since the author's avowed intention of proceeding "without any sort of criticism of the opinion held by others" naturally fails to clarify the controverted issues. It is hardly possible today to maintain a minority view in science without extreme rigour in argument and even some degree of acerbity.

Throughout the book the reader is brought up short before suggestions for which little in the way of supporting evidence is provided. A case in point is raised by the discussion of the embryology of the nervous system in vertebrates and invertebrates on pp. 61–64. After pointing out that the nervous system is ectodermal in origin in both cases, we are told that "on this anatomical basis we may safely build a functional superstructure." The skin and nervous system are held to form "two facets of a single entity" and the author appears to regard the "structure-function complex" so constituted as responsible for the manifestation of the *sentiment intérieur* postulated by Lamarck.

An interesting point is made in the author's consideration of evolutionary direction. More realistic than the exponents of "progress," Professor Wood Jones perceives "a general running down of life in the production of myriads of species all of which are unprogressive end products." One would like to see this view, with its close analogy to the Second Law of Thermodynamics, developed further. He has also some stimulating remarks to make on the dysgenic effects of domestication; in particular he points out how man is among the domestic animals most seriously affected.

Many readers will concur with the author's strictures on contemporary military ethics, though perhaps few are likely to regard the lapdog in so disapproving a light. In general the author pursues his theme with mild-tempered urbanity, describing with due moderation the present vitalist position, without effectively proselytizing.

BOELL, E. J. (EDITOR)
Dynamics of growth processes.
Princeton University Press, New Jersey 1954 : 60s. : Pp. vii + 304 : figs. : tables : plates.

For several years past the American Society for the Study of Development and Growth has held an annual symposium on some aspect of growth and has published the contributions as supplements to the journal *Growth*. The eleventh symposium on the dynamics of growth was held during June 1952 at Williamstown, Massachusetts and was sponsored in conjunction with the Committee on Developmental Biology of the American National Research Council. The present volume comprises the thirteen papers presented at the symposium, the Society for the Study of Development and Growth having decided to publish the contributions to this symposium as a separate book.

The first paper by L. M. Kozloff reviews present knowledge on virus reproduction and is largely a confession of current ignorance. A. Novick and L. Szilard illustrate how their chemostat technique can be used to investigate aminoacid synthesis in bacteria. Protein synthesis is treated by A. W. Pollister; he shows the usefulness of experiments on autolysis and lays great stress on the microsomes as loci of protein synthesis. G. Fankhauser deals with nucleus-cytoplasm interrelations, including a short consideration of endopolyploidy and polyploidy proper. Differentiation of plant tissues is treated by D. S. Van Fleet; he devotes his principal attention to the significance of redox potentials and to the distribution of enzymes and hormones. External factors affecting plant growth, in particular temperature and light, are discussed by F. W. Went; he also considers the significance of diffusion, whose role in the regulation of growth appears to have been underrated. The last of the botanical papers is by F. Skoog on growth substances; he attributes great importance to the interactions between auxin and nucleic acid components.

Two of the contributions are primarily mathematical. The first, by D. A. Sholl, is on allometric growth and the detection of oscillating components in growth curves; the second, by F. E. Smith, analyses the significance of exponential and sigmoid population-growth curves. It is interesting to note that both these authors warn against too facile curve fitting, and both emphasize that, even when a mathematical relationship between two variables has been satisfactorily established, we may still be far removed from any inkling as to its biological significance.

Of the zoological papers, plant breeders will probably be most interested in the survey of the genetics of animal growth by G. E. Dickerson, especially as the working concepts of plant and animal breeders differ considerably in their emphasis.

The remaining papers are of more special zoological or chemical interest and comprise the following: K. R. Porter, Cell and tissue differentiation in relation to growth (animals); R. Gaunt, Chemical control of growth in animals; and W. W. Greulich, The relationship of skeletal status to the physical growth and development of children.

VOGEL, S.
Blütenbiologische Typen als Elemente der Sippengliederung dargestellt anhand der Flora Südafrikas. (**Floral biological types as elements in classification, illustrated from the flora of South Africa**).
Bot. Stud., Gustav Fischer Verlag, Jena 1954 : DM 40 : **1** : Pp. x + 338 : 177 figs. : 5 plates : tables.

In this interesting monograph, Dr. Vogel presents the results of a detailed survey of the floral biology of representatives of 47 South African families studied during a recent visit.

The monograph opens with a review of the classifications of floral mechanisms devised by such authors as Delpino, Müller, Werth and Kugler. The fundamental question as to whether there is such a thing as a "natural" classification of floral types is then broached and the author concludes that the older "utilitarian" classifications based on the assumption that natural selection is an adequate explanation of the present diversity of floral types are unsatisfactory, in particular because many of the characteristic features of the various floral types recognized by the author have no evident adaptive significance.

A useful distinction is made between the taxonomic, morphological and functional aspects of floral construction, termed *Bauplan*, *Gestalttyp* and *Stil* respectively. Having untangled these aspects, the author gives a thorough description of the different types of floral construction (*Stil*) associated with ornithophily and with pollination by the different types of insect visitors. The treatment is sufficiently comprehensive to be applicable to insect dispersion of spores in the Phallaceae and in the moss genus *Splachnum*.

Three new categories (*Stil*) of insect-pollinated flowers are recognized: (1) the filiform type, in which the flowers or inflorescences are born on long slender peduncles, the visitors being small bees; (2) quivering constructions (*Flimmerbildung*), found in flowers with bauble-like appendages which shake in a breeze and appear to attract flies; and (3) star-shaped flowers visited by night-flying moths.

Most of the monograph is taken up with careful descriptions of the morphology and pigmentation of the flower, nectar production and localization, smell, seasonal development and insect or bird visitors of the various species investigated by the author. This section is illustrated with numerous original diagrams and photographs.

The author concludes that the taxonomic, morphological and functional aspects of floral construction are largely independent. In many families, comparative uniformity in the taxonomic and morphological aspect of floral construction is associated with considerable diversity in the functional aspect. As mentioned above, Dr. Vogel is of the opinion that many of the characteristic features of his functional categories (*Stil*) are of no adaptive significance, and he therefore rejects both Darwinian and neo-Lamarckian explanations of the convergent evolution of such types of construction. The alternative explanation that he suggests is rather elusive, but some sort of immanent action whereby the evolution of the flower is directionally orientated appears to be envisaged. This view enshrines a concept of teleology rather of the original Aristotelian sort and is closely related to the notion of organic finality expounded in recent years by Troll. Neo-Darwinian readers will doubtless find the author's invocation of immanent evolutionary tendencies distasteful. It may be, however, that less artificiality is involved by so doing than by devising hypothetical linkages to associate floral pigmentation patterns, say, with characters whose adaptive significance can reasonably be assumed.

SCHUSSNIG, B.
Grundriss der Protophytologie. (**The elements of protophytology**).
Gustav Fischer Verlag, Jena 1954 : DM 28 : Pp. viii + 310 : 407 figs.

Vol. I of Professor Schussnig's *Handbuch der Protophytenkunde* appeared in 1953 and was reviewed in *PBA*, Vol. XXIII, p. 657. The present volume is on a more elementary level and aims at providing a general introduction to the morphology and reproduction of the Thallophyta, excluding viruses, bacteria and the Cyanophyceae.

The treatment follows along fairly conventional lines; moderately detailed descriptions are given of representative species of the various morphological categories recognized by the author and an account is also given of the Rhizopoda, Foraminifera, Radiolaria, Sporozoa, Myxosporidia and Haplosporidia, considered as heterotrophic offshoots of the Protophyta proper. The Charophyta are treated in an appendix.

The morphological system used is on the whole traditional and not without artificiality. The flagellate unicell is taken first, then the unicellular forms without flagella. The next category is the cenoblast, including the cenocytic algae and fungi. Whether it is advantageous to include cenobial types like *Scenedesmus* and *Pediastrum* or the filamentous Cladophorales with such typical cenocytes as *Vaucheria* may well be questioned. The remaining thallophytes are relegated to the polyblastic category, of which three levels are recognized: the simple filamentous; the stichoblastic, including multiseriate filaments and parenchymatous forms; and the symphyoblastic, exemplified by the plectenchymatous higher fungi and such algae as *Mesogloea* and *Codium*. There is much to be said for attemptiug to devise a morphological system for the Thallophyta as a whole, but many botanists might doubt the advisability of erecting categories that associate such divergent organisms as the ascomycetes, basidiomycetes, and the more complex representatives of the Phaephyceae and Siphonales.

Professor Schussnig's introduction will doubtless serve as a useful intermediate text book where German is understood, though it is to be feared that the *studierende deutsche Jugend* to whom the book is dedicated will have to stomach a quite unnecessary surfeit of unusual Greek terms. The book is copiously illustrated with diagrams of diverse merits.

CLARKE, G. L.
Elements of ecology.
John Wiley & Sons, Inc., New York and Chapman & Hall, Ltd., London 1954 : 60s. : Pp. xiv + 534 : figs.

In its broadest sense, the science of ecology can be defined as the study of the relations between plants and animals and their environment; it will then include most of biology, biochemistry and biophysics. In its narrower sense, ecology is taken to refer to the study of plant and animal communities. The approach to the subject in the present volume is analytical, that is, the effects of individual environmental factors are considered first, commencing with the simpler systems of interaction and proceeding thence to the more complex. To deal with the subject exhaustively would require more than one volume, but here, within the compass of some 500 pages a happy compromise has been reached. The first seven chapters, dealing with the physical environmental factors, lead up, by way of a general treatment of nutrition, to intraspecific and interspecific relationships.

This gives a very sound groundwork to the student of ecology. The final chapter dealing with the community concept, classification of communities and succession, is of a very general nature and scarcely detailed enough to be of much help to the field ecologist, although sufficient for the general reader.

Conciseness is unfortunately not one of the most pronounced traits of the book, and its size could have been reduced by improvements in this respect and by the omission of such platitudes as "the abundance of a species in an area tends to increase because of reproduction, and to decrease because of death."

An abundance of figures bearing out and elucidating the text are for the most part beyond criticism, although it is hard to see the point of the picture on p. 373 of the yucca moth about to enter the yucca flower. Nor is the book free from confusing typographical errors or even serious inaccuracies, for instance on p. 390, where barberry (*Berberis*) is confused with *Ribes* as the secondary host of the white pine rust.

The use of Latin and English names does not appear to follow any consistent system, and some species are indexed under the one, some under the other. The index, although running to twelve pages, is inadequate for such a comprehensive work.

The merits of an inclusive treatment of both plant and animal ecology, which is the special feature of this book, are numerous, although in many places this appears to result in a rather cumbersome account. In the final chapter on the dynamics of the ecosystem, this procedure is well justified, however, and an even more detailed discussion of this would have been welcome.

R. H. R.

SCHARRER, K.
Biochemie der Spurenelemente. (**Biochemistry of trace elements**).
Paul Parey, Berlin and Hamburg 1955 : 3rd ed. : DM 39.60 : Pp. viii + 404 : 8 plates : 10 tables.

The first and second editions of this work were published in the war years and in the third, which now appears, the author has attempted to cover much of the work published in America, England and elsewhere, which was not mentioned in the previous editions or has been published since their appearance. Much of this material is cited from references in abstract journals rather than from the originals. There are a few inaccuracies in citation of some of the non-German works but the volume provides a useful reference book on a group of elements that is attracting more and more attention both in agriculture and in physiology. It is taken to comprise those elements which are known to have some physiological action but do not belong to the so-called classical group whose members play a major role in physiological processes. Thus gold, silver and mercury are excluded as having no known physiological effect, iron and magnesium as having too much. Within these limits each element is treated in turn, in alphabetical order according to the German name; 34 elements in all are dealt with, a brief review being given of what is known about their effect on different groups of plants or microorganisms, or in the soil. Separate bibliographies are provided for each element. A further section treats the elements on similar lines in relation to their effects on animal and plant nutrition. A series of coloured plates illustrates the symptoms of some of the diseases caused by deficiency of such elements as boron, manganese, copper and zinc.

WENRICH, D. H., LEWIS, I. F. & RAPER, J. R. (EDITORS)
Sex in microorganisms. A symposium presented on December 30, 1951 at the Philadelphia meeting of the American Association for the Advancement of Science.
American Association for the Advancement of Science, Washington 1954 : $5.75 : Pp. v + 362 : figs. : tables : plates.

At the meeting of the American Association for the Advancement of Science at Philadelphia on 30 December, 1951 a symposium on Sex in microorganisms was presented and the contributions to that symposium serve as the basis for this volume. They have been slightly enlarged for the published version and together they reveal that sexual phenomena are widely distributed among microorganisms, although again many groups appear to get along quite successfully without. It is also seen that the pattern of sexual behaviour varies widely both within and between the different groups and in his final summing-up the editor fails to arrive at any uniform system to explain either the nature or origin of sexual behaviour as a vital phenomenon. Each contributor to the symposium dealt with a different group of organisms, as follows:—

Visconti, N. Genetic recombination in bacterial viruses. (pp. 1–11).

The phenomena of mutual exclusion, recombination, vegetative phage and triparental heterozygosis are described historically and the theory is advanced that (1) prophage particles multiply and mate pairwise at random inside the bacterial cell; (2) vegetative phage particles go on mating and multiplying up to the time of lysis; and (3) mature phage particles which are accumulated in the bacterial cell do not mate.

Lederberg, J. & Tatum, E. L. Sex in bacteria—genetic studies, 1945–1952. (pp. 12–28).

The authors outline the work done on auxotrophic and other mutants, and the various genetic studies that have led to the conclusion that most if not all characteristics of bacteria are controlled by hereditary units analogous with genes in higher organisms, recombination occurring only when some sort of contact can be established between the cells. Evidence for the linear arrangement of the genes on one or more chromosomes includes that from the heterozygous diploids occurring under the influence of the mutant *Het* in *Escherichia coli*. The peculiar fertility relationships dependent on the infective nature of F+, which is shown to be independent of the λ virus, are discussed in terms of the concept of relative sexual potencies on the one hand and of transduction on the other.

Hutchinson, W. G. & Stempen, H. Sex in bacteria. Evidence from morphology. (pp. 29–41).

A review is given of a number of reports of cell association in bacteria, most of which are insufficient to prove the occurrence of true sexual fusion.

Raper, J. R. Life cycles, sexuality and sexual mechanisms in the fungi. (pp. 42–81).

An outline is given of the various types of life cycle encountered in the fungi, the various patterns of heterothallism with the genetic devices that underlie them, and the sexual mechanisms found in the fungi. An attempt to formulate some phylogenetic progression leads only to the suggestion that each type of heterothallism has evolved independently from a primitive homothallic type, a number of the more advanced homothallic types being derived from the corresponding heterothallic by mutation.

Patrick, R. Sexual reproduction in diatoms. (pp. 82–99).

The various systems encountered besides vegetative division by mitosis, which is the commonest form, are described. The Centrales, in which sexual reproduction is least frequent, contain a large percentage of species that have remained constant since Miocene times. Other groups, in which sexual reproduction is more frequent, have evolved more rapidly.

Lewin, R. A. Sex in unicellular algae. (pp. 100–33).

A review of the literature shows the existence of much contradictory evidence and opinion on such questions as the existence of true homothallism, the effect on sexual activity of light, pH and various other environmental and nutritional factors, the role of chlorophyll, sex hormones and chemotaxis and the inheritance of sex. It is suggested that a concerted approach on a single organism, such as that made on *Neurospora* or *Escherichia*, would help to solve a number of these problems.

Wenrich, D. H. Sex in protozoa. A comparative review. (pp. 134–265).

A rather comprehensive review of the literature concerned with the different classes and orders includes a presentation of the evidence for hormones inducing sexual processes in flagellates, being based largely on the published work of Cleveland.

Nanney, D. L. Mating type determination in Paramecium aurelia. *A study in cellular heredity. (pp. 266–83).*

The review presented includes an account of many unpublished observations of T. M. Sonneborn; the cytoplasm determines the nature of the new macronucleus but is itself determined by the old macronucleus; the precise nature of the macronuclear control remains obscure but the evidence suggests that it is exerted by physiological rather than structural features of the macronucleus. The pattern of nucleocytoplasmic cooperation emphasizes the conclusion that the cytoplasm is not a passive but an active partner in cellular heredity.

Metz, C. B. Mating substances and the physiology of fertilization in ciliates. (pp. 284–334).

An account is given of the normal fertilizing processes in *Paramecium*, showing that the mating reaction results from interaction of substances or molecular configurations attached to or built into the surface structure of the cell. These substances do not diffuse out into the surrounding liquid. Their role in other aspects of fertilization is analysed. The high degree of specificity of the mating reactions shows the substances to possess complex molecular structure, each substance being structurally similar but not identical. They retain their activity under certain conditions in dead animals but are destroyed by proteolytic enzymes. In certain other ciliates conjugation-inducing fluids have been detected; their role is interpreted as being to induce the formation of adhesive substances which enable conjugation to take place.

Cold Spring Harbor symposia on quantitative biology. Volume XVIII. Viruses.

Long Island Biological Association, New York 1953 : $8.00 : Pp. xvi + 301 : figs. : tables.

The 1953 meeting of the Cold Spring Harbor Symposia on Quantitative Biology was the first to be devoted entirely to the fundamental aspects of virus research and its results, embodied in this, the eighteenth volume of the Symposia, are of unique interest as giving a cross section of the most recent knowledge of a rapidly expanding subject. Much of the field covered is of as much interest to the geneticist as to the virologist and the following gives a very brief outline of the ground covered in the many excellent papers presented.

Doermann, A. H. The vegetative state in the life cycle of bacteriophage: evidence for its occurrence and its genetic characterization. (*pp. 3–11*).

Various lines of evidence are reviewed which indicate that upon infection of a host cell the virus particle separates into two parts, the protein membrane, which remains behind, and the DNA-containing portion which penetrates the cell and replicates, during which time the virus is noninfective. Other evidence supports 1) a linear order of the genetic factors within each linkage group, 2) a replicating mechanism in which replicates may themselves be the parents of subsequent genetic structures, 3) a repetitive series of encounters, any one of which may result in recombination of genetic markers, 4) a distribution of encounters such that the individual progeny particles have not experienced an identical number of encounters, and 5) a mechanism to account for progeny particles which are diploid for small segments of the genetic material. Reference is made to the model of Visconti and Delbrück to account for these phenomena (cf. *PBA*, Vol. XXIII, Abst. 1767) and to others in which recombination is visualized as part of the process of replication.

Levinthal, C. Recombination in phage: its relationship to heterozygosis and growth. (*pp. 13–14*).

Data from three-factor crosses are adduced in favour of the hypothesis that heterozygotes arise by the overlapping of chromosome sections from different parent phages. This view is shown to be in consonance with the structure of DNA suggested by Watson and Crick (cf. *PBA*, Vol. XXIV, Absts. 57–8).

Fraser, D. & Dulbecco, R. A genetic analysis of the factors controlling the h character in bacteriophage T3. (*pp. 15–17*).

The experiments described show that a number of different strains of the phage T3 exist corresponding to different degrees of resistance in strains of *Escherichia coli* B differing in strength of the h character. Crosses of strains differing in grade of h gave recombination according to the expected scheme, except that a series of low-grade strains isolated from an h^+ strain gave no recombinants in intercrosses, while in crosses with h^+ they gave segregants of a higher h grade.

Appleby, J. C. Genetic recombination experiments with influenza virus. (*pp. 19–20*).

From combined inoculations of NWS and KUNZ viruses, both previously irradiated with ultraviolet rays, a new virus combining some of the properties of both was recovered; it is thought to have originated by reassortment of genetic units in a manner analogous to that which occurs in bacterial viruses. No such reassortment was observed in mixed inocula of the A and B strains of the virus.

Burnet, F. M. & Lind, P. E. Influenza virus recombination: experiments using the de-embryonated egg technique. (*pp. 21–24*).

From a mixed inoculation of M+ and WS− strains a fluid was obtained which gave serological results indicating the presence of virus particles possessing phenotypic characters corresponding to both parents.

Hirst, G. K. Intracellular reactions between two types of influenza virus. (*pp. 25–27*).

Joint inoculations of the M and W strains of the A virus produced fluids in which up to 85% of the virus particles gave reactions to antisera of both parent strains; on further passages these new forms gave a certain number of the parent forms as well as further mixed forms.

Levinthal, C. & Fisher, H. W. Maturation of phage and the evidence of phage precursors. (*pp. 29–33*).

Electron-microscope pictures are presented to illustrate the intracellular precursors of the virus at the stage of transition from the vegetative state.

Henle, W. Developmental cycles in animal viruses. (*pp. 36–44*).

The significance of the "disappearance" or masking of the virus after adsorption, and of the production of incomplete virus incapable of infection, is discussed; recent results make it seem likely that the incomplete virus represents an intermediary stage in virus development. Electron micrographs show that its particles are larger than those of infectious virus.

Sanders, F. K. Evidence of a multiplication cycle in mouse encephalomyelitis virus. (*pp. 45–50*).

Studies indicate the existence of a vegetative phase as in phage and influenza virus.

Maramorosch, K. Do developmental stages occur in the reproductive cycle of aster-yellows virus? (*pp. 51–54*).

An eclipse period of about four days set in after inoculation of the virus either into susceptible plants or into its insect vector; the evidence is not yet sufficient to show whether the eclipse represents a loss of infectivity during a stage of maturation or merely a low concentration during the initial stages of multiplication.

Schlesinger, R. W. The relation of functionally deficient forms of influenza virus to viral development. (pp. 55–59),
Evidence is presented which supports the view that the end products of so-called "incomplete" growth cycles of influenza virus may in fact be complete viral units which have gone through the entire developmental cycle, but which emerge in the end malformed and deficient in ability to reproduce, and not that they are a normal phase of development.

Melnick, J. L. & Gaylord, W. H. (Jun.). Intracellular development of pox viruses. (pp. 61–63).
Various stages of maturation from the developmental forms to the mature virus particles are described and depicted.

Bertani, G. Lysogenic versus lytic cycle of phage multiplication. (pp. 65–70).
Descriptions are given of the lysogenic condition and of various atypical forms of it and evidence is presented in support of the hypothesis that a lysogenic cell contains a limited number of prophage sites, where prophages are located and may recombine or substitute one another, there being a linkage of some kind between the prophage and some nuclear constituent of the host cell. Even the possibility that the genetic material of host cell and phage are partly homologous is considered.
Various phenomena of interaction in cases of mixed infection are also discussed.

Lieb, M. Studies on lysogenization in Escherichia coli. (pp. *71–73*).
After the λ phage has transferred its nucleic acid into the host cell it must "temporarily attach to a site on the bacterial component G, which also carries the gene *Gal*$_4$. Temperate *lambda* may have a special region that tends to get 'stuck' on G while in the case of *lambda* v*1–t* the region is different and cannot get stuck. However, both *lambda* and *lambda v1* mutants must attach to G to become 'activated,' that is, acquire the ability to start vegetative reproduction. Virulent mutants, like *lambda v*2, are not dependent on the G site for activation or actively displace the prophage. The union of *lambda* and G may be brought about by attraction between negatively-charged phage nucleic acid and positively-charged bacterial chromosomal protein. Under certain conditions, *lambda* remains at the activation site on G and becomes transformed to prophage by a temperature-sensitive process. The prophage is closely bound to G, multiplied synchronously and only rarely is lost. If only one prophage is present, it may duplicate to block the entire site on G. *Lambda* or *lambda v1* particles entering the lysogenic cell cannot multiply because they cannot reach the activation site. What may account for this coincidence of activation site and prophage site? Perhaps this is the ancestral home of the phage, where the phage has left some part of itself and for which it still retains natural ties."

Hayes, W. The mechanism of genetic recombination in Escherichia coli. *(pp. 75–93).*
An outline is presented of the present state of knowledge on genetic recombination in bacteria, with particular reference to the F agent in *E. coli*, which is found to resemble temperate phage in the stability of its relationship with the host cell and the efficiency of transmission but to differ from phage in the absence of lytic properties. It is transmitted to F$^-$ cells which then continue to replicate it; the possession of *F* in at least one parent is necessary for fertility to occur. F$^+$ cells are distinguished from F$^-$ by resistance to the effects of streptomycin and an increase of fertility after ultraviolet treatment. In crossing, recombinants derive most of their genetic material from the F$^-$ parent, only part of the F$^+$ genome apparently being transmitted. There is evidence that this represents only one linkage group, though occasionally it would seem that two or more linkage groups may enter one F$^-$ cell concomitantly. The Hfr strains of Cavalli *et al.* (cf. *PBA*, Vol. XXIII, Abst. 1713) possess an agent HF which may have arisen from *F* by mutation. It is thought possible that the F agent plays the role of a genetic vector in recombination and a hypothesis is presented to explain the mechanism of this transfer.

Appleyard, R. K. Segregation of lambda lysogenicity during bacterial recombination in E. coli *K-12. (pp. 95–97).*
In the crosses described both the presence of lysogenicity and the individual phage characters were linked to the galactose allele, and presented an impediment to recombination of the galactose allele. In doubly lysogenic strains both were linked to galactose. It is suggested that lysogenicity consists of a single additional cell component, the prophage, attached to the bacterial genetic apparatus at a specific locus.

DeLamater, E. D. The mitotic mechanism in bacteria. (*pp. 99–100*).

The cytological evidence so far shows the presence of three chromosomal bodies in bacteria, a finding shown to accord with the three linkage groups demonstrated in *E. coli* by Hayes, whose data, it is submitted, do not exclude the idea of a regular sexual process in bacteria.

Jacob, F. & Wollman, E. L. Induction of phage development in lysogenic bacteria. (*pp. 101–21*).

The conditions affecting the phenomenon of induction, i.e. the conversion of lysogenic cultures to active phage-producing cultures by irradiation and other shocks, are discussed; the similarity between phage induction and colicin induction is pointed out. In bacteria that had undergone mixed infection with one inducible and one noninducible phage each prophage behaved independently; the same was found in mixed infections with two related inducible phages, no genetic recombination being observed. These results and those of photorestoration are taken as indicating that induction is the consequence of some change in the bacterium, possibly in the link between prophage and bacterial chromosome.

Watson, J. D. & Crick, F. H. The structure of DNA. (*pp. 123–31*).

A fuller account is given of the conclusions referred to in *PBA*, Vol. XXIV, Absts. 57–8 regarding the structure of DNA and its genetical implications. It is thought probable that protein forms a third helical chain between the pair of polynucleotide chains. Various difficulties encountered in envisaging the process of replication on the model suggested are discussed and it is thought that the DNA probably folds up into a compact bundle as it is made. Mutations are envisaged as resulting from occasional tautomeric shifts in the hydrogen atoms in one of the bases, leading to new arrangements in pairing.

Wyatt, G. R. The quantitative composition of deoxypentose nucleic acids as related to the newly proposed structure. (*pp. 133–34*).

Analyses of nucleic acids from a number of different sources show the number of moles of adenine to be equal to that of thymine and the number of moles of guanine equal to that of cytosine, a result which is in accordance with the structure of DNA proposed by Watson and Crick (see above) although other factors must be operative in determining the proportions of 5–methyl cytosine and 5–hydroxymethyl cytosine.

Hershey, A. D. Functional differentiation within particles of bacteriophage T2. (*pp. 135–39*).

Some evidence is presented which leads to the view that the particle of T2 phage consists of (1) a tail by which it attaches to the bacterium, (2) an osmotic membrane that protects the viral contents from enzymes and (3) the contents, consisting chiefly of DNA. When infection has taken place the DNA begins to increase at once, reaching a maximum at the beginning of maturation. Phosphorus incorporated early into the precursor DNA is transferred almost completely to phage particles formed later. Possible implications of these findings in respect of the genetical role of DNA are discussed.

Markham, R. Chemistry of some functional components of viruses. (*pp. 141–48*).

An outline is given of the properties of the nucleic acids and some new information is presented concerning their composition, the view being favoured that RNA is a straight chain of 3′-5′-linked nucleotides ending with either a free 3′ (or 2′) phosphate residue or with a 2′ : 3′ cyclic phosphate residue. Strains belonging to any one group of viruses have RNA very similar in gross composition, whereas the RNA from different groups is different in composition. Less variation is observed in DNA composition.

Studies of the turnip yellow mosaic virus have led to the conclusion that in the plant viruses the nucleic acid is held inside the protein, mainly by steric forces rather than chemical bonds. In plants infected with the virus a virus particle without its nucleic acid has been found.

Puck, T. T. The first steps of virus invasion. (*pp. 149–54*).

The first stages of infection of a host cell by the phage T2 are analysed and it is shown that practically all the virus-resistant mutants of *E. coli* 'B' owe their immunity to failure of one of the steps occurring prior to the injection of DNA by the virus. The first of these steps is the formation of reversible electrostatic bonds between sites on the virus and a portion of a repeating set of charged groups which forms a gene-controlled pattern covering the host cell surface. This is followed by the irreversible separation of the DNA and protein portions of the phage on the cell surface, which is a direct consequence of the attachment and is not enzymatic. Further steps are killing of the cell and lysis of the cell wall.

Weidel, W. Phage receptor systems of E. coli *B.* (*pp. 155–57*).

Some experiments are described which show that the steps in invasion referred to by Puck (see above) vary considerably according to the phage used and to environmental conditions not concerned with the ionic system. The cell membrane is envisaged as a large, mainly two-dimensional molecular sheet of regular structure, with chemical groups forming periodically repeated patterns all over it. A change in a certain amino group might affect the adsorption of one single phage strain or of several, without their being taxonomically related.

Lanni, F. & Lanni, Y. T. Antigenic structure of bacteriophage. (*pp. 159–68*).

The data presented support the belief that phage contains two distinct antigens, both confined to the skin, and that they are segregated between the head and the tail.

Schäfer, W. & Munk, K. Studies on the complement-fixing-antigen of the fowl plague virus. (*p. 169*).

The antigen size was calculated from the sedimentation constant and from electronmicrographs as about 15 mμ.

Lark, K. G. & Adams, M. H. The stability of phages as a function of the ionic environment. (*pp. 171–83*).

The results reported suggest that various divalent cations form, with some heat-labile site on the phage particle of T5, a complex which is more stable than the free phage. Heat-stable mutants of T5 show many features in common with the stable forms produced by cations. The site of the complex concerned is thought to be the tip of the tail and this may be the mechanism which controls the adsorption on to the host surface and the injection of nucleic acid into the host cell.

Williams, R. C. The shapes and sizes of purified viruses as determined by electron microscopy. (*pp. 185–95*).

A re-examination by the freeze-drying and critical-point techniques has made it possible to introduce a number of corrections concerning the detailed morphology of several viruses, some of which are illustrated.

Anderson, T. F. The morphology and osmotic properties of bacteriophage systems. (*pp. 197–203*).

Further data confirming that phage particles are adsorbed by the tails are presented and various factors which influence the susceptibility of T6 to osmotic shock are discussed.

Jesaitis, M. A. & Goebel, W. F. The interaction between T4 phage and the specific lipocarbohydrate of phase II Sh. sonnei. (*pp. 205–08*).

It is shown that Phase II of *Shigella sonnei* contains a lipocarbohydrate which is a component of an antigenic complex that acts on the T phages apparently causing the release of genetically active material from the phage when it encounters the host cell.

Kozloff, L. M. Origin and fate of bacteriophage material. (*pp. 209–20*).

Experiments with phage T7 labelled with N^{15} have shown that less than 5% of the parental protein is transferred to the new generation of phage, as opposed to the nucleic acid, of which some 40% is transferred. In none of the experiments described and referred to has there been a positive correlation between transfer of any particular element and transfer of hereditary units. Thus there is no evidence of the existence of special parts of the virus which are conserved and transferred to the progeny as nucleic acid fragments of any considerable size. Much of the P is transferred in a form other than as nucleotide and it would seem that at least some of the nucleic acid breaks down; a part of the breakdown product is used again for nucleic acid synthesis but the host cell also contributes N and P to the nucleic acid of the viral progeny, also apparently in the form of degradation products of host DNA, all of which seems to be transferred to the viral progeny.

Shortly after infection with $T6r^+$ a specific inhibitor of deoxyribonuclease is partially destroyed; the inhibitor has been identified as a form of RNA.

Cohen, S. S. Studies on controlling mechanisms in the metabolism of virus-infected bacteria. (*pp. 221–35*).

The existence of a new pyrimidine, 5–hydroxymethyl cytosine, has been demonstrated in r and r^+ strains of the T–even phages. Possible metabolic effects of this product in the infected host are discussed and a case is mentioned where a thymine-requiring strain, 15T, is enabled to synthesize thymine when infected with T2.

Luria, S. E. Host-induced modifications of viruses. (*pp. 237–44*).

Host-controlled modification of phage involves, on the one hand, a restriction by one or more hosts of the growth ability of the phage on some hosts and, on the other hand, a release of the restriction by some other hosts. The latter hosts in turn may or may not impose other alternative restrictions. The modifications imposed by successive hosts are not additive but mutually exclusive. A given modification seems to be similar in all genetic mutants of a phage. The phenomenon, which comprises the complete transformation of one form of virus into another upon a single cycle of intracellular growth in a modifying host, has not yet been observed in animal or plant viruses but its existence is not excluded.

Bowen, G. H. Studies of ultraviolet irradiation phenomena—an approach to the problems of bacteriophage reproduction (pp. 245–53).

Data presented show that ultraviolet irradiation produces a chemical change in DNA which might be the cause of ultraviolet inactivation of phage particles. The changes seem to produce their lethal effect during the vegetative phase of phage growth, during which genetic replication is thought to proceed. The extreme sensitivity to ultraviolet points to the assumption that inactivation of any one of the nucleotides may suffice to produce a lethal effect. The general efficacy of light in photoreactivation suggests that its effect is not specific but may serve to repair any of the nucleotides that may have been damaged by the ultraviolet.

Stent, G. S. Mortality due to radioactive phosphorus as an index to bacteriophage development. (pp. 255–59).

Experiments with bacteria infected with phages T2 and T3 containing a high specific activity of radioactive phosphorus have shown that the DNA molecule disrupted by the disintegration of the P^{32} atom was the one which actually contained that atom; it would seem that phage death results only when the atom is actually ejected at disruption, and that this happens only once in twelve disruptions.

Mortality diminishes during the course of development of the phage, as in the case of ultraviolet irradiation, from which it is concluded that the target is indeed DNA, which is built up during this period, making the virus gradually more independent of parental DNA.

Zinder, N. D. Infective heredity in bacteria. (pp. 261–69).

The phenomena of transformation and transduction are described and the view put forward that they both comprise the transfer of restricted amounts of genetic material from donor bacteria to recipient bacteria. In each case transference affects individual characters and if more than one character is involved each is transferred independently of the other; if several genes affect one character then each behaves separately in transformation or transduction. Moreover, many characters, such as motility in *Salmonella* spp., can be shown by transduction experiments to be complex; thus five motility loci, two paralysis loci and another controlling speed of motility have all been shown to behave independently. Certain cases of linked transduction are also referred to. Certain more complex phenomena of transformation in *Pneumococcus* and *Hemophilus* are possibly ascribable to complex loci.

In the discussion H. E. Alexander referred to experiments with highly purified forms of DNA which showed that DNA plays the role of hereditary determinant, though the expression of genetic change requires a substrate that appears to be present only in a small proportion of the population.

Baron, L. S. Genetic transfer by means of Vi phage lysates. (pp. 271–72).

Transductions of the ability to develop without purine and of the ability to ferment xylose in *Salmonella typhosa* by the phage Vi are reported. The transduced cells do not become lysogenic for the phage that transduced them.

Dulbecco, R. & Vogt, M. Some problems of animal virology as studied by the plaque technique. (pp. 273–79).

The technique of producing plaques from a single virus particle on monolayer tissue cultures is described; the results indicate the existence of a vegetative phase as in bacteriophages.

Youngner, J. S. Some observations on the behaviour of poliomyelitis viruses in tissue culture. (pp. 281–83).

Differences in behaviour in tissue culture were noticed in strains that could not be distinguished immunologically.

Syverton, J. T. & Scherer, W. F. Applications of strains of mammalian cells to the study of animal viruses. (pp. 285–89).

A pure strain of mammalian cells originating from a single cell is announced for the first time for use in virus experiments.

Fenner, F. Host parasite relationships in myxomatosis of the Australian wild rabbit. (pp. 291–94).

Reduction in the death rate in epizootics of myxomatosis in rabbits in Australia is due partly to immunological causes and partly to the appearance of less virulent mutants of the virus. Variation in the resistance of the hosts may have occurred but has not yet been demonstrated.

Sánchez-Monge Parellada, E.
Fitogenética (mejora de plantas). [**Plant genetics (plant breeding)**].
Salvat Editores, Barcelona 1955 : Pp. xvi + 511 : 91 figs. : 45 tables.

A general textbook of plant breeding for Spanish readers has long been wanting and the present volume, under the general editorship of Dr. Sánchez-Monge but with contributions by M. Angulo Busquets, M. Álvarez Peña and A. Zubeldia Lizarduy, supplies that need. Starting with a general exposition of the methods used in modern plant breeding, including the elements of field experimentation and statistical methods, it proceeds to an outline of what has been done in breeding the main agricultural and horticultural crops of interest in Spain. These include potatoes, tobacco, sugar beet, sugar cane and cotton as well as the main cereals and a range of vegetables and fruit trees.

Each chapter is supplied with a list of references to the basic literature on the subject and the volume is completed by a combined author and subject index.

Howie, J. W. & O'Hea, A. J. (Editors)
Mechanisms of microbial pathogenicity. Fifth symposium of the Society for General Microbiology held at the Royal Institution, London, April 1955.
Cambridge University Press 1955 : 25s. : Pp. x + 333 : figs. : tables.

Disease resistance has come to be one of the principal aims in almost all plant breeding programmes. In a great many cases the mechanism of resistance to any particular disease is still unknown, and while it is possible to breed for resistance with but a hazy conception as to its nature, it is obvious that all fundamental investigations into the mode of infection of serious plant pathogens must be of special interest to plant breeders.

The Fifth Symposium of the Society for General Microbiology, which was devoted to problems connected with pathogenicity, was held in London in April of this year. The basis for the discussions was provided by the sixteen papers assembled in the present volume.

Botanists will be most interested in the opening paper and the last three. The first article is by A. A. Miles and considers the definition of such concepts as pathogenicity, parasitism, virulence and resistance. The author of this paper emphasizes the highly relativistic nature of all these concepts. The first of the final group of botanical papers is by R. K. S. Wood and deals with the pectic enzymes secreted by many pathogenic fungi. Among the more interesting of the facts discussed is the lethal effect of protopectinase on plant cells and the inhibition of this effect by plasmolysis. These effects seem to indicate an unexpected degree of interaction between the cell wall and the outer layer of the cytoplasm. P. W. Brian discusses the evidence for toxin production in plants by pathogenic fungi and bacteria. It is noted that varietal differences in the resistance of stone fruits to *Pseudomonas mors-prunorum* appear to be correlated with insensitivity to toxic extracts.

Some of the most important recent investigations on the nature of resistance to wilt diseases, in particular *Fusarium lycopersici* affecting tomatoes and *Verticillium albo-atrum* infecting hops, have been made by W. G. Keyworth, who contributes the final paper. This work has shown the importance of distinguishing between the resistance of different parts of the plant, notably the stem and underground parts. The author's work seemed to show that, in the case of both the diseases mentioned, the stems of over-all resistant or susceptible varieties do not differ in their degree of resistance or susceptibility. Keyworth is unable to harmonize these results with those of Scheffer and Walker who found differences in the resistance of the stems of tomato cuttings to *Fusarium* (cf. *PBA*, Vol. XXIV, Abst. 2544).

The remaining papers of the symposium are zoological or medical and include the following: W. E. van Heyningen, The role of toxins in pathology; A. M. Pappenheimer, The pathogenesis of diphtheria; M. G. Macfarlane, On the biochemical mechanism of action of gas-gangrene toxins; G. Payling Wright, Botulinum and tetanus toxins; R. J. Dubos, Properties and structures of tubercle bacilli concerned in their pathogenicity; H. Smith and J. Keppie, Studies on the chemical basis of the pathogenicity of *Bacillus anthracis* using organisms grown *in vivo*; T. W. Burrows, The basis of virulence for mice of *Pasteurella pestis*; F. Hawking, The pathogenicity of protozoal and other parasites: general considerations; P. C. C. Garnham, The comparative pathogenicity of protozoa in their vertebrate and invertebrate hosts; B. G. Maegraith, The pathogenicity of plasmodia and entamoebae; C. A. Hoare and R. A. Neal, Host-parasite relations and pathogenesis in infections with *Entamoeba histolytica*; and G. C.

Ainsworth, Pathogenicity of fungi in man and animals.

Detailed descriptions of varieties of wheat, barley and oats.
Nat. Inst. agric. Bot. Cambridge 1954 : unpaginated : figs. : tables.

Designed primarily for the use of inspectors of seed crops, this pocket handbook provides descriptions of varieties of wheat, oats and barley recommended by the National Institute of Agricultural Botany, Cambridge, England. The varieties described are those recommended in 1954; the book is made in loose-leaf form so that additional varietal descriptions can be incorporated and leaves dealing with any varieties withdrawn from the recommended lists can be readily removed. Since it is intended primarily as an aid to identification, the catalogue includes only brief references to the uses and merits of the varieties; fuller particulars of the uses of varieties may be obtained from the current leaflets issued by the institute. A glossary is provided and diagrammatic drawings explain the terms used in the text.

NEUMANN, M. P. & PELSHENKE, P. F.
Brotgetreide und Brot. (**Bread cereals and bread**).
Paul Parey, Berlin and Hamburg 1954 : 5th Ed. : DM 76 : Pp. xii + 622 : 210 figs. : tables.

M. P. Neumann's well-known textbook has for some time been out of date and in this fifth edition it has been extensively modified and revised by Professor Pelshenke. The new edition starts with a botanical section in which the two main bread cereals, rye and wheat, are described. A brief outline is given of existing knowledge on their botanical characteristics, origin and improvement by breeding and the German varieties at present in the official variety register are given, with data on the extent of their cultivation. A curiously arbitrary list of foreign varieties, many of them misspelt, also appears. The structure of the cereal grain is examined in some detail, the effects of various diseases and pests, and of premature germination, upon the grain quality are outlined and the main weeds of cereal crops are described and illustrated.

The next section deals with the chemical composition of the grain and the properties of gluten. This is followed by sections on fermentation, the behaviour of yeasts, the classification of wheats according to quality, and grain storage and drying. The production and properties of flour are next considered, then dough and the phenomena and problems connected with the preparation of bread in its various forms. Questions of baking quality receive a special chapter, which includes brief descriptions of the farinograph and other devices for measuring quality, and a final chapter discusses the value of bread as an article of diet; here the age-old problem of white versus brown or wholemeal bread is resolved in favour of a balanced mixture of all three.

The book is said to be designed for farmers and millers rather than for the more scientific reader and this, together with the very wide field it covers, has clearly made it necessary to confine the accounts of each section of this field to a rather general outline. Nevertheless its predecessor has for long been regarded, even among scientists, as a standard work on the subject and we cannot help regretting that at least some more precise indication could not have been given of the source of much of the information presented; authors are repeatedly referred to in the text but there are no bibliographical references either for the individual chapters or for the work as a whole. The book is otherwise well documented and illustrated, though some of the photographic reproductions are somewhat antiquated in appearance.

FISCHNICH, O. & HÖPPNER, E.
Bestimmungsschlüssel für Kartoffelsorten an Lichtkeim und Knolle. (**Key for the determination of potato varieties on the basis of the sprouts exposed to light and the tuber**).
Landwirtschaftlicher Verlag Karl Mann, Hildesheim 1954 : DM 28.50 : Pp. 46 : figs. : 87 plates.

The object of this useful little book is to provide a rapid method, employable at any season of the year, of determining the varietal authenticity of potato samples. By treating the tubers with Rindite, a dormancy-breaking substance consisting of seven parts of ethylene chlorhydrin, three parts of ethylene dichloride and one part of carbon tetrachloride, sprouts are induced to develop within 6–10 days under conditions of complete darkness. Exposure to light for a further period of 24 hours results in the formation of pigments and varieties may then be distinguished by the characteristic colouring and morphological features of their sprouts.

The basic principles underlying this method are not new, similar investigations having been carried out by Snell as far back as 1932 (cf. *PBA*, Vol. III, p. 223). The present work, however, constitutes the first serious attempt to classify a wide range of varieties by these means and to provide a systematic key to their identification. All the potatoes at present included in the West German list of approved varieties are dealt with in a thorough manner and it is the intention of the authors to carry out similar studies on new varieties as and when they appear on the market and to keep their publication up to date by issuing the results of subsequent experiments. It is to this end that the book has been published in the form of a folder, in order that fresh leaves may be inserted as they are completed.

The preliminary sections give a lucid and comprehensive account of the technique employed, together with diagrams illustrating the basic morphological features of the germinating sprout. In order to ensure that the reader fully comprehends the basic theory involved, two examples, using Ostbote [Eastern Messenger] and Corona, are provided and the authors demonstrate, step by step, how they arrive at their final conclusions concerning the identity of these varieties. Section VI provides data on the morphology of the sprouts of each individual variety and section VII classifies the different varieties into groups according to the shape and colour of their sprouts.

In the second half of the book the varieties are arranged in alphabetical order, a single sheet being provided for each. A photographic reproduction, in which all the features of the sprout are clearly distinguishable, is accompanied by a detailed description of each relevant morphological character. Finally, small coloured drawings, noteworthy for the wealth of detail they contain, are reproduced to demonstrate varietal differences in colouring.

At first sight this publication may appear expensive. One must, however, consider the amount of meticulous care and painstaking work that have obviously been involved in its compilation. Not only does it make fascinating reading, but it is also presented in a most attractive manner.

URQUHART, D. H.
Cocoa.
Longmans, Green & Co., London 1955 : 35s. : Pp. xix + 230 : 19 figs. : tables : plates.

This is the second in a series of books on tropical agriculture being published with the encouragement of the Colonial Advisory Council of Agriculture, Animal Health and Forestry. Intended as a practical handbook for cacao planters, the book starts with a brief introductory chapter on the origin of cacao, followed by a chapter on the botany of cacao written by Prof. R. E. Baker; this contains an explanation of the terminology of varieties and types, with a useful clarification of the sometimes confusing use of expressions such as Criollo, Nacional, Forastero, Trinitario, Fine and Ordinary. Chapters devoted to climate and soils are followed by full descriptions of the management of cacao plantations. Peasant culture in West Africa, rehabilitation of plantations in Trinidad, pests and diseases are next dealt with and a special chapter is devoted to virus diseases; a not very optimistic outlook seems to be taken in the half-page dealing with the selection of resistant types; the use of clonal seed is advocated as a means of avoiding too great a degree of genetic purity.

A chapter entitled Research gives an outline of the development of scientific investigation on the cocoa crop in the British Commonwealth and other parts of the world. A final chapter gives some information regarding world production and consumption and short appendices deal with soil surveys, costs, cuttings, fermentation and preparation of Bordeaux mixture, the last appendix comprising a glossary of twenty technical terms used in the text. The volume is provided with an index and a number of photographic illustrations, some of them in colour.

FREUDENBERG, G. & CAESAR, R.
Arzneipflanzen. Anbau und Verwertung. (**Medicinal plants. Their cultivation and utilization**).
Paul Parey, Berlin and Hamburg 1954 : DM 16.80 : Pp. 204 : 63 figs. : tables.

The large group of plants used from time immemorial for simples and later forming the basis of scientific medicine remains one of the most fascinating in the plant kingdom. They enjoy an importance altogether incommensurate with the limited scale of their cultivation. This is made clear by the authors of this beautiful book, who first trace the history of the medicinal plants as an object of cultivation and pass on to their cultural requirements and classification according to the compounds they produce; a special section is devoted to a description of the individual species and their uses. For each species details are given regarding the drugs it furnishes, its name in Latin, German, English and French, the area in which it grows, the amounts under cultivation, methods of cultivation and yield; the existence of land varieties or improved types is indicated when such exist; in some plants improved forms have been produced consciously by breeding, in which case they are referred to. The last chapter is devoted to breeding and gives a very brief outline of the methods by which the drug content and yield of these valuable plants may be increased, interspecific crossing and the production of polyploids being included under the methods mentioned. A useful feature in the section on utilization is an alphabetical list of the plants referred to, arranged in the order of their German names, showing the drugs and other preparations that are obtained from each.

The volume is admirably printed on excellent paper and contains a number of illustrations, also of high quality. It is completed by a fairly comprehensive bibliography and a well-arranged subject index.

REED, C. A. & DAVIDSON, J.
The improved nut trees of North America and how to grow them.
The Devin-Adair Co., New York 1954 : $6.00 : Pp. xxv + 404 : 14 figs. : 22 plates.

The term nut, as it is conveniently if loosely used in this book, covers not only fruits with edible kernels, such as walnuts, filberts and almonds, but also a few such as the horse chestnuts which are generally considered to be unpalatable to either man or his domestic animals. The first and largest section, occupying 104 pages, is devoted to a survey of the history, cultivation and uses of the species and varieties of the walnut group, particular attention being given to *Juglans nigra* and, to a lesser extent, to *J. regia*. Subsequent chapters deal in a similar manner but less fully with hickories, pecans, chestnuts, filberts and almonds, while considerably less detailed treatment is afforded to the native oaks, horse chestnuts and beech and to some introduced species of minor importance. In addition to the details of cultural practices provided in the chapters on individual groups, general information on the cultivation and propagation of nut trees is given in later chapters. Control of pests and diseases is briefly treated and in two final chapters notes are given on the food value and by-products of nuts.

The title is perhaps misleading, since many of the trees described have not been cultivated and bred sufficiently for any improved varieties to be available; but the authors are careful to point out those species which in their opinion would respond to selection and breeding. Covering as it does all the important aspects of nut cultivation and marketing and providing also numerous references, this book should prove of considerable use to the prospective nut-grower.

7e beschrijvende rassenlijst voor groentegewassen (inclusief vroege aardappel, aardbei, tabak, geneeskrachtige en aromatische kruiden). [**Seventh descriptive variety list of vegetables (including early potatoes, strawberries, tobacco, and medicinal and aromatic herbs**)].
Inst. Vered. Tuinbouwgewassen, Wageningen 1955 : f. 1.75 : Pp. 186 : figs. : tables.

The 1955 edition of this reference book, which is issued annually by the Institute for the Breeding of Horticultural Plants, Wageningen, has been thoroughly revised and a number of its sections have been enlarged (cf. *PBA*, Vol. XXIII, p. 486 and Vol. XXIV, p. 298). The various crops are arranged in alphabetical order and, in the case of the newer varieties, the name of the breeder is given, reference to any particular variety being facilitated by a comprehensive index at the end of the book. Of particular interest are the sections on peas and beans, which include useful information on diseases and disease resistance and on varieties suitable for canning and preserving.

This publication may be thoroughly recommended. Its modest price bears little relation to the amount of valuable information it contains and it should prove of considerable value to all market gardeners.

Tuinbouwgids 1955. (**Horticultural guide, 1955.**)
Uitgave der Directie van de Tuinbouw, Den Haag 1955 : f 5 : Pp. 806 : figs : plates.

This valuable reference book for horticulturalists will be already well known to readers of *Plant Breeding Abstracts* and requires little further recommendation. The twelfth and current edition has been thoroughly revised and the number of pages increased from 704 in 1954 to 806 in 1955. Sections are included on the varieties of fruit, vegetables, tobacco and ornamental plants cultivated in the Netherlands, the market garden industry, the exploitation of land reclaimed from the sea, fertilization and irrigation, and methods of combating plant diseases and insect pests. The usefulness of the publication is enhanced by a large number of coloured plates illustrating the damage caused by certain diseases. Detailed statistical data on the fruit industry are also provided. To foreign readers, the glossary at the end, with its English, German French and Swedish equivalents of Dutch terms, should prove of particular value, together with the register of Dutch breeders, seed producers and research institutes. The comprehensive system of indexing provides ready access to the mass of detailed information contained in this excellent work.

NEW JOURNALS

Radiation Research.

The Radiation Research Society was recently formed with the aim of coordinating and promoting research on the physical, chemical and biological effects of radiation. *Radiation Research* is the journal of this society. It occasionally includes contributions dealing with genetical aspects and abstracts are given of papers presented at the meetings of the society. The first annual meeting was held at Iowa University, June 1953. The second annual meeting took place at Cleveland, May 1954. The relevant papers are referred to in this number of *Plant Breeding Abstracts* and in Vol. XXIV, No. 4.

The journal, the first issue of which appeared in February 1954, is published bimonthly by the Academic Press Inc. (subscription $9.00 per year). Further information may be obtained from the Managing Editor, T. C. Evans, College of Medicine, State University of Iowa, Iowa City, Ia., USA.

Wheat Information Service.

On the occasion of the ninth International Congress of Genetics, held at Bellagio, Italy, in August 1953, a group of geneticists, representing 19 countries, met to discuss problems of wheat genetics. The main decisions arrived at were as follows: (1) the publication *Wheat Information Service* (WIS) is to be issued biannually from the Laboratory of Genetics, Biological Institute, Kyoto University, Japan, to facilitate international cooperation in research on wheat genetics by providing information on methods, stocks and research; (2) the USDA Plant Industry Station, Beltsville, Md., is to be the centre at which genetic material will be collected and maintained; the Laboratory of Genetics, Kyoto University, is to be the corresponding centre for *Aegilops* stocks; and (3) an international wheat symposium is to be held in 1956 if possible, in Japan. The contents of the first issue of WIS are indicated in Abst. 1842. Further information concerning the publication may be obtained from Dr. K. Yamashita, Laboratory of Genetics, Biological Institute, Kyoto University, Kyoto, Japan.

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